Proposed Carolina Bays Parkway Extension
Brunswick County, North Carolina and Horry County, South Carolina
NCDOT STIP Project No. R-5876
SCDOT STIP Project No. P029554

ADMINISTRATIVE ACTION

Draft Environmental Impact Statement

July 2025

U.S. Department of Transportation
Federal Highway Administration

Co-Lead Agency: Federal Highway Administration
310 New Bern Avenue, Suite 410
Raleigh, North Carolina 27601-1418
Project Contact: Seth Wilcher
Telephone: (919) 856-4346

Co-Lead Agencies:

North Carolina Department of Transportation
5501 Barbados Boulevard
Castle Hayne, North Carolina 28429
Project Contact: Aaron R. LeBeau, PE
Telephone: (910) 341-2000

South Carolina Department of Transportation
P. O. Box 191
Columbia, South Carolina 29202
Project Contact: Stacey Johnson, PE
Telephone: (803) 737-3715

Cooperating Agency
US Army Corps of Engineers

7/4/2025
Date

for DocuSigned by:
E932DEEC5B6240F...
Yolonda Jordan
Division Administrator
Federal Highway Administration

7/3/2025
Date

DocuSigned by:
A4434EAD4F42476...
Trevor K. Carroll, PE
Division Engineer – Division 3
North Carolina Department of Transportation

7/4/2025
Date

Signed by:
E4495189640E4F0...
Chad Long
Director of Environmental Services
South Carolina Department of Transportation

The proposed action is the construction of the Carolina Bays Parkway Extension from its current northern terminus at SC 9 in Horry County, South Carolina to the US 17 Shallotte Bypass in Brunswick County, North Carolina. The project is proposed to be a four-lane, full control of access freeway, part on new location. This statement documents the need for the proposed project and evaluates alternatives with respect to identified beneficial and adverse social, economic, and environmental impacts. Current and projected future traffic conditions in the study area are described. A Preferred Alternative is recommended.

Proposed Carolina Bays Parkway Extension
Brunswick County, North Carolina and Horry County, South Carolina
NCDOT STIP Project No. R-5876
SCDOT STIP Project No. P029554

ADMINISTRATIVE ACTION

Draft Environmental Impact Statement

July 2025

Documentation Prepared by
NV5 Engineers and Consultants

with contributions from:
STV, Inc.
HDR, Inc.

7/3/2025
Date

DocuSigned by:
Eric Midkiff
7DDE81D473D94A4...

Eric Midkiff, PE
NV5 Engineers and Consultants
Project Manager

for the:

North Carolina Department of Transportation

and

South Carolina Department of Transportation

7/3/2025
Date

Signed by:
Aaron LeBeau
9EA44C839ECF4D3...

Aaron R. LeBeau, PE
North Carolina Department of Transportation
Division 3, Project Development Unit
Project Manager

7/3/2025
Date

DocuSigned by:
831F8EBE97514F5...

Stacey Johnson, PE
South Carolina Department of Transportation
Preconstruction Division – Pee Dee Region
Pee Dee Regional Production Engineer

Table of Contents

Appendices

List of Tables

List of Figures included in Appendix A

Project Commitments

Proposed Carolina Bays Parkway Extension

Brunswick County, North Carolina and Horry County, South Carolina

NCDOT STIP Project No. R-5876

SCDOT STIP Project No. P029554

SCDOT Environmental Services Office

Additional coordination with the US Fish and Wildlife Service regarding the project's potential effects on tricolored bat in South Carolina will be conducted prior to completion of the final environmental document for this project. Surveys will be conducted during the appropriate survey window for Canby's dropwort and pondberry. Surveys of the Construction Phase 1 – Scenario 1 (CP1 – S1) corridor along existing Little River Road (S-111) and Mineola Avenue (S-50) only will also be conducted during the appropriate survey window for American chaffseed and red-cockaded woodpecker.

NCDOT Environmental Analysis Unit

Surveys of the Construction Phase 1 – Scenario 2 (CP1 – S2) corridor along existing Calabash Road only will be conducted during the appropriate survey window for the following species: Cooley's meadowrue, red-cockaded woodpecker, and rough-leaved loosestrife.

NCDOT Environmental Analysis Unit; SCDOT Environmental Services Office

Detailed archaeological surveys will be conducted for the project following selection of the Applicant's Preferred/Least Environmentally Damaging Practicable Alternative (LEDPA) corridor by the interagency Merger Team. The detailed archaeology survey will be conducted along the LEDPA corridor and the results will be detailed in the Final Environmental Impact Statement (FEIS).

NCDOT Environmental Analysis Unit; SCDOT Environmental Services Office

Twenty-eight noise barriers were identified that may meet the feasibility and reasonableness criteria found in the respective NCDOT and SCDOT traffic noise abatement policies. After selection of the Applicant's Preferred/LEDPA corridor, more in-depth Traffic Noise Model (TNM) modeling will be performed in these locations as needed to verify that mitigation is both feasible and reasonable. The final decision on the installation of abatement measures will be made upon completion of the project design and public involvement process.

NCDOT – Roadway Design Unit, Hydraulics Unit, Roadside Environmental Unit, and Division 3

Twenty-seven streams within, or within one mile downstream, of the seven Detailed Study Alternative corridors have been designated High Quality Waters (HQW) by the North Carolina Division of Water Resources (NCDWR). All are located within North Carolina and are unnamed tributaries to either Lookout Branch or the Shallotte River. None have been designated as Outstanding Resource Waters (ORW) by NCDWR. All of these streams are identified in Table E-1 in Appendix E and are designated as HQW due to the classification of their receiving waters. Design Standards in Sensitive Watersheds will be implemented for these streams during project design and construction.

NCDOT – Hydraulics Unit and Division 3

The Hydraulics Unit will coordinate with the NC Floodplain Mapping Program (FMP), the delegated state agency for administering the Federal Emergency Management Agency's (FEMA's) National Flood Insurance Program, to determine the status of the project with regard to applicability of NCDOT's Memorandum of Agreement with FMP (dated April 22, 2013, modified August 12, 2016), or approval of a Conditional Letter of Map Revision (CLOMR) and subsequent final Letter of Map Revision (LOMR). This project involves construction activities on or adjacent to FEMA-regulated streams in North Carolina. Therefore, Division 3 shall submit sealed as-built construction plans to the Hydraulics Unit upon completion of project construction, certifying that the drainage structure(s) and roadway embankment that are located within the 100-year floodplain were built as shown in the construction plans, both horizontally and vertically.

NCDOT and the Federal Highway Administration (FHWA), North Carolina Division, will coordinate with SCDOT to confirm SCDOT's agreement of a design variance for the proposed 100-year storm as NCDOT has for this project. FHWA will approve this exception for both NCDOT and SCDOT during the design phase following the completion of the NEPA process as the approval constitutes a federal action.

SCDOT – Hydraulics Design Unit and District 5

The South Carolina portion of the project is located in the Pee Dee River Basin. For the South Carolina hydraulic sites, SCDOT Standard Erosion Prevention Best Management Practices (BMPs) and Standard Sediment Control BMPs will be utilized for the Carolina Bays Parkway Extension. Notice of Intent (NOI) will be completed to document and ensure National Pollution Discharge Elimination System (NPDES) requirements and other stormwater permitting requirements are met.

NCDOT Environmental Analysis Unit

The NCDOT Environmental Analysis Unit Mitigation and Modeling Section will investigate potential on-site stream and wetland mitigation opportunities once the Applicant's Preferred/LEDPA corridor has been selected. On-site mitigation will be used as much as possible. Offsite mitigation needed to satisfy the Federal Clean Water Act requirements for this project will be provided by the North Carolina Division of Mitigation Services (NCDMS), NCDOT Stream and Wetland In-Lieu Fee Program. If NCDMS cannot provide sufficient credits for all of the required mitigation, private mitigation banks with available credits will be used to supplement credits from NCDMS.

SCDOT Environmental Services Office

Once the Applicant's Preferred/LEDPA corridor is selected, SCDOT will investigate the availability of stream and wetland mitigation credits at commercial mitigation banks which service the project area. The USACE's Regulatory In-lieu Fee and Bank Information Tracking System (RIBITS) site will be used to identify banks with available credits. Mitigation banks servicing the project area with available credits will then be contracted to confirm availability and cost for credits needed.

NCDOT – Geotechnical Engineering Unit and Division 3

Thirty-three sites of concern were identified within the project study area. The NCDOT GeoEnvironmental Section should be notified if any additional sites are discovered so their potential impact(s) can be assessed. Sites of concern identified in the report should be reviewed once final Right-of-Way plans are completed to determine if Phase II investigations and Right-of-Way Recommendations are necessary prior to right-of-way being acquired.

NCDOT Right-of-Way Unit

If right-of-way is acquired from a Voluntary Agricultural District (VAD) property through eminent domain, the Brunswick County VAD Ordinance requires NCDOT to request that the Agricultural Advisory Board hold a public hearing on the proposed condemnation before condemnation may be initiated. Any VAD lands converted to non-agricultural use as part of a temporary construction easement must be returned to farmable condition by the project's completion.

Summary

S.1 Type of Action

Administrative Action Environmental Impact Statement

(X) Draft ( ) Final

S.2 Contact

Federal Highway Administration

Yolonda Jordan
Federal Highway Administration
310 New Bern Avenue, Suite 410
Raleigh, North Carolina 27601-1418
(919) 856-4346

North Carolina Department of Transportation

Aaron R. LeBeau, PE
Division 3 Project Manager
North Carolina Department of Transportation
5501 Barbados Boulevard
Castle Hayne, North Carolina 28429
(910) 341-2000

South Carolina Department of Transportation

Stacey Johnson, PE
Pee Dee Regional Production Engineer
South Carolina Department of Transportation
P.O. Box 191
Columbia, South Carolina 29202
(803) 737-3715

For individuals with sensory disabilities, this document can be made available in Braille, large print, on audiocassette, or on computer disk. To obtain a copy in one of these alternate formats, please contact Seth Wilcher at (919) 856-4346 or 310 New Bern Avenue, Suite 410, Raleigh, North Carolina 27601-1418.

S.3 Proposed Action

S.3.1 Description of Proposed Action

South Carolina Department of Transportation (SCDOT) State Transportation Improvement Program (STIP) Project P029554 and North Carolina Department of Transportation (NCDOT) STIP Project R-5876 involve the construction of the proposed Carolina Bays Parkway Extension. The SCDOT portion is within Horry County, South Carolina, and the NCDOT portion is within Brunswick County, North Carolina. These projects are included in the SCDOT 2024-2033 STIP and the NCDOT 2024-2033 STIP, respectively.

- For project P029554, SCDOT proposes to extend Carolina Bays Parkway (SC 31) from its current northern terminus at SC 9 in Horry County, South Carolina to the North Carolina State Line. In the SCDOT 2024-2033 STIP, right-of-way acquisition is planned to begin in 2026 and construction in 2028.
- For project R-5876, NCDOT proposes to continue the Carolina Bays Parkway Extension from the South Carolina State Line to the US 17 Shallotte Bypass in Brunswick County, North Carolina. The proposed Carolina Bays Parkway Extension is not currently funded for right-of-way or construction

in the NCDOT 2024-2033 STIP. NCDOT will determine options for financing the proposed project in North Carolina, and the financial plan will be included in the Final Environmental Impact Statement (FEIS).

The Carolina Bays Parkway Extension is proposed to be a four-lane, full control of access freeway, part on new location. The length of the proposed project varies from 19.7 miles to 22.0 miles.

S.3.2 Purpose of Proposed Action

The National Environmental Policy Act (NEPA)/Section 404 Merger Team (Merger Team) concurred on the purpose of and need for the proposed project at the March 19, 2019, Concurrence Point 1 (Purpose and Need and Study Area Defined) meeting. The Merger Team agreed upon the following purpose statement for the proposed project:

> The primary purpose of the project is to improve the transportation network in the study area by enhancing mobility and connectivity for traffic moving in and through the project area.
>
> Mobility refers to the movement of people or goods. Potential measures of performance for evaluating an improvement in mobility in the project area are travel time, travel speed and level of service (LOS). SCDOT has established the LOS goal of C for their state roads while NCDOT has established the target goal of LOS D for system level planning analysis.
>
> Connectivity refers to the density of connections in road networks and the directness of links. Potential measures of performance for evaluating improvements in connectivity are reduced travel times and enhanced route options for travelers, service providers, and the transport of goods.

S.4 Detailed Study Alternatives

Alternatives considered for the proposed project include the No-Build Alternative, the Transportation Systems Management Alternative (TSM), the Travel Demand Management Alternative (TDM), the Mass Transit Alternative, and the build alternatives. The Merger Team developed to make decisions at key points in the project development process determined that the TSM, TDM, and Mass Transit alternatives did not fully meet the primary purposes of and transportation needs for the proposed project and recommended eliminating these from detailed study.

Nine Preliminary Corridor Concepts were established using geographic information systems (GIS) software from Environmental Systems Research Institute (ESRI) to develop a “best path” model for the study area. The model analyzed natural and human environment features, weighted for constraint factors, and generated best path alignments between termini for which potential corridors would generate the least overall impacts. The modeling effort was also supplemented with input from local officials and the Merger Team. After the model was run for all routes, centerlines were developed to reflect best path alignments using the modeled corridor, roadway design criteria and constructability considerations, aerial photography, field evaluations to verify certain features, and environmental features mapping. The centerlines were buffered and nine Preliminary Corridor Concepts were generated using 1,000-foot-wide corridors.

The Preliminary Corridor Concepts that met the purpose of and need for the proposed project and with the least impacts to the human and natural environments were identified by the Merger Team, and seven Detailed Study Alternatives (Alternatives 1, 1A, 2, 4, 4A, 7, and 8) (see Exhibit A) were selected by the Merger Team for detailed evaluation in this Draft Environmental Impact Statement (DEIS). The

Detailed Study Alternatives selection process incorporated recommendations made by Federal and state environmental regulatory and resource agencies and local municipal stakeholders, as well as comments received from two open house public meetings held in December 2019. The Detailed Study Alternatives were further refined as more comprehensive information was obtained through detailed field studies and environmental analysis. Refer to Section 2.3 for detailed descriptions and figures showing the seven Detailed Study Alternatives.

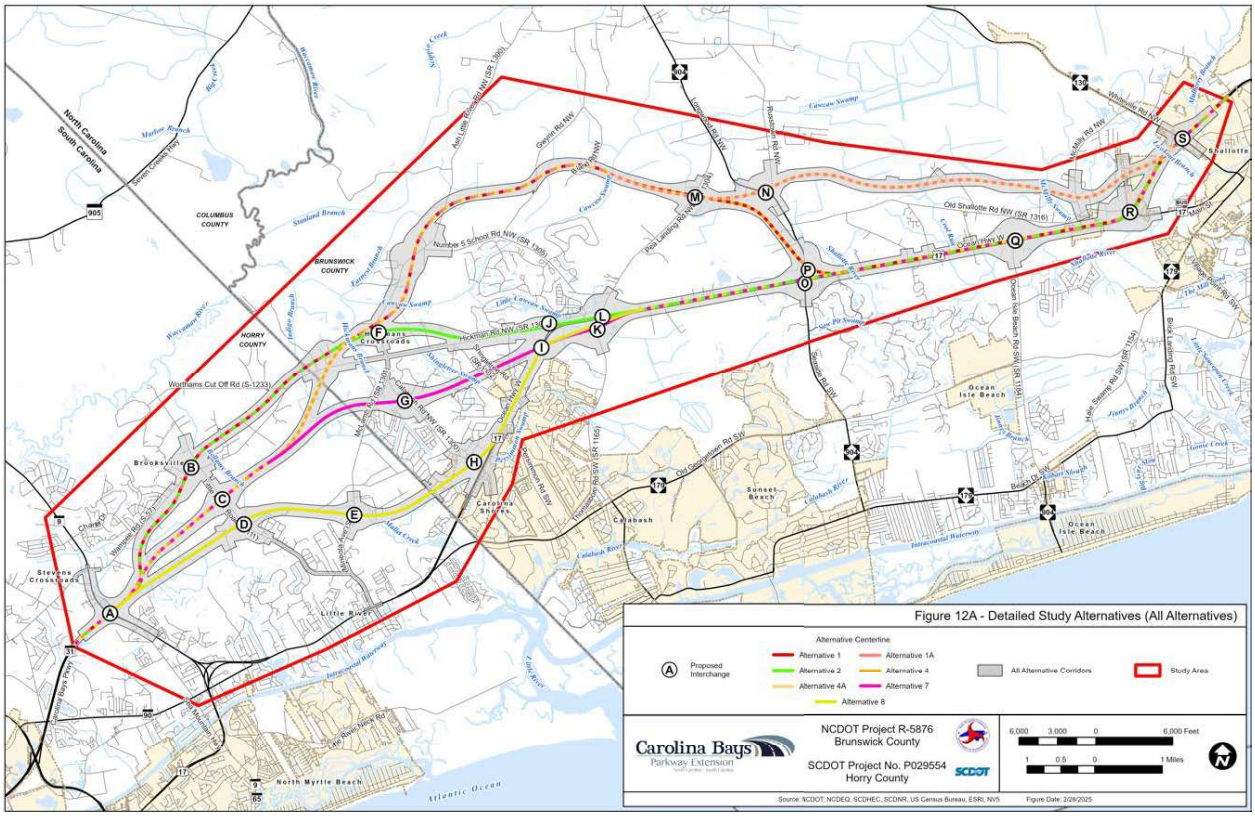

Exhibit A. Detailed Study Alternatives

S.5 Summary of Impacts with Detailed Study Alternatives

A comparison of the seven Detailed Study Alternatives is shown in Table S-1.

On January 20, 2025, President Trump signed Executive Order (E.O.) 14148, *Initial Rescissions of Harmful Executive Orders and Actions*, and E.O. 14154, *Unleashing American Energy*. The E.O.s revoked E.O. 13990, *Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis* (January 20, 2021), and E.O. 14008, *Tackling the Climate Crisis at Home and Abroad* (January 27, 2021). Subsequently, on January 29, 2025, Secretary Duffy signed a Memorandum for Secretarial Offices and Heads of Operating Administrations, *Implementation of Executive Orders Addressing Energy, Climate Change, Diversity, and Gender*. On February 25, 2025, the Council on Environmental Quality (CEQ) published an Interim Final Rule removing the CEQ's NEPA implementing regulations, effective April 11, 2025 (90 Fed. Reg. 10610). As a result of these actions, the Federal Highway Administration (FHWA) will not include greenhouse gas emissions and climate change analyses in the federal environmental review process. Any purported greenhouse gas emissions and climate change impacts will not be considered in the federal decision. Accordingly, no greenhouse gas emissions or climate change analyses are included in this DEIS.

Table S-1. Summary Comparison of Detailed Study Alternatives

Impact Category[1]	Detailed Study Alternatives													
	1		1A		2		4		4A		7		8	
	Total		Total		Total		Total		Total		Total		Total	
	SC	NC	SC	NC	SC	NC	SC	NC	SC	NC	SC	NC	SC	NC
Length (miles)	22.0		21.3		20.4		21.9		21.2		19.7		20.0	
	5.6	16.4	5.6	15.7	5.6	14.8	5.5	16.4	5.5	15.7	5.4	14.3	6.0	14.0
Natural Resource Impacts														
Delineated Wetlands (acres)	150.3		204.5		143.4		162.2		216.5		140.4		139.3	
	45.4	104.9	45.4	159.1	45.4	98.0	57.9	104.3	57.9	158.6	51.4	89.0	39.5	99.8
Delineated Streams (linear feet)	14,818		12,632		9,865		12,590		10,403		8,089		11,469	
	4,909	9,909	4,909	7,723	4,909	4,956	2,673	9,917	2,673	7,730	2,943	5,146	4,613	6,856
Delineated Tributary Waters (linear feet)	15,145		15,682		12,975		15,312		15,849		10,613		8,947	
	1,125	14,020	1,125	14,556	1,125	11,850	1,870	13,442	1,870	13,978	1,733	8,880	1,703	7,244
Delineated Ponds (acres)	6.8		17.5		8.6		5.6		16.4		10.0		7.9	
	3.8	3.0	3.8	13.7	3.8	4.8	2.8	2.8	2.8	13.6	3.6	6.4	3.9	4.0
Delineated High Quality Waters (HQW) (linear feet)[2]	8,370		5,290		3,770		8,370		5,290		3,770		3,770	
	N/A	8,370	N/A	5,290	N/A	3,770	N/A	8,370	N/A	5,290	N/A	3,770	N/A	3,770
Federally-Protected Species	All seven of the Detailed Study Alternatives have a biological conclusion of May Affect, Likely to Adversely Affect (MA-LAA) on the northern long-eared bat and the tricolored bat (NC only). In SC, the biological conclusion for tricolored bat is Unresolved.													
100-Year Floodplain (acres)	101.2		69.5		157.9		102.0		70.2		85.1		99.6	
	0.0	101.2	0.0	69.5	0.0	157.9	0.0	102.0	0.0	70.2	0.0	85.1	0.0	99.6
Floodway (acres)	0.3		0.4		0.3		0.3		0.4		0.3		0.3	
	0.0	0.3	0.0	0.4	0.0	0.3	0.0	0.3	0.0	0.4	0.0	0.3	0.0	0.3
Human Environment Impact														
Residential Displacements	62		140		105		39		118		266		130	
	28	34	28	112	28	77	4	35	4	114	4	262	24	106
Business/ Nonprofit Displacements	42		15		52		37		11		41		54	
	7	35	7	8	7	45	3	34	3	8	3	38	3	51

Table S-1. Summary Comparison of Detailed Study Alternatives (continued)

Impact Category[1]	Detailed Study Alternatives													
	1		1A		2		4		4A		7		8	
	Total		Total		Total		Total		Total		Total		Total	
	SC	NC	SC	NC	SC	NC	SC	NC	SC	NC	SC	NC	SC	NC
Historic Resources	1[3]		1[3]		1[3]		1[3]		1[3]		1[3]		1[3]	
	1[3]	0	1[3]	0	1[3]	0	1[3]	0	1[3]	0	1[3]	0	1[3]	0
Cemeteries	6		6		6		8		8		6		6	
	2	4	2	4	2	4	4	4	4	4	3	3	2	4
Prime Farmland (acres)	967.8		738.2		1,014.5		910.9		681.3		845.3		932.5	
	194.4	773.4	194.4	543.8	194.4	820.1	126.4	784.5	126.4	554.9	129.7	715.6	147.3	785.2
Noise Receptor Impacts	71		74		175		40		40		179		126	
	35	36	38	36	35	140	4	36	4	36	4	175	17	109
Physical Environment Impacts														
Geo-environmental Sites	21		9		26		20		8		23		25	
	4	17	4	5	4	22	3	17	3	5	3	20	3	22
Communication Tower	2		2		1		2		2		1		1	
	0	2	0	2	0	1	0	2	0	2	0	1	0	1
Project Costs														
Total Costs[4] (millions)	$831.8		$687.8		$851.8		$797.0		$652.0		$851.6		$910.8	
	$229.5	$602.2	$230.1	$457.6	$228.5	$623.2	$186.1	$610.9	$186.2	$465.8	$184.6	$667.0	$237.8	$672.8

[1]Impact calculations are based on functional design slope stake limits plus 40-foot buffer. Some total acreage and linear feet amounts may not add up exactly due to rounding.
[2]The High Quality Waters (HQW) classification is not used in South Carolina.
[3]Little River United Methodist Church Cemetery (further review required to determine potential eligibility for the National Register of Historic Places).
[4]Total costs include right-of-way acquisition, utility relocation, wetland and stream mitigation, and construction costs.

On January 20, 2025, President Trump signed E.O. 14148, *Initial Rescissions of Harmful Executive Orders and Actions*, and E.O. 14154, *Unleashing American Energy*. The E.O.s revoked E.O. 14096, *Revitalizing Our Nation's Commitment to Environmental Justice for All* (April 21, 2023). Subsequently, on January 21, 2025, President Trump signed E.O. 14173, *Ending Illegal Discrimination and Restoring Merit-Based Opportunity*. This E.O. revoked E.O. 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (February 11, 1994). On February 25, 2025, the CEQ published an Interim Final Rule removing the CEQ's NEPA implementing regulations, effective April 11, 2025 (90 Fed. Reg. 10610). As a result of these actions, all federal environmental justice requirements are revoked and no longer apply to the federal environmental review process. FHWA, Federal Transit Administration (FTA), and Federal Railroad Administration's (FRA's) Joint NEPA regulations (23 CFR 771) and the agencies' Interim Final Guidance on "Section 139 Environmental Review Process: Efficient

Environmental Reviews for Project Decisionmaking and One Federal Decision" (December 17, 2024) do not require an environmental justice analysis. Accordingly, no analysis of environmental justice is included in this DEIS. Any purported environmental justice impacts will not be considered in the federal decision. Social, economic, and community impacts will continue to be disclosed, where applicable, in accordance with 23 CFR 771.

S.6 SCDOT/NCDOT Preferred Alternative

Although all of the Detailed Study Alternatives are still under consideration, Alternative 4 has been identified by both the SCDOT and the NCDOT as those agencies' Preferred. A final decision on the alternative selection will not be made until comments received on the DEIS and at the corridor public hearing have been fully evaluated. After the corridor public hearing, the Merger Team will meet to select the Applicant's Preferred/Least Environmentally Damaging Practicable Alternative (LEDPA) corridor in accordance with the procedures detailed in the NEPA/Section 404 Merger Process, which includes consideration of public comments and the local sponsors' Preferred Alternative. According to the Merger Process, the Applicant's Preferred/LEDPA corridor is the best solution to the problem satisfying the transportation need and considering environmental and community resources. Once the Merger Team concurs on the Applicant's Preferred/LEDPA corridor, the final decision on the Applicant's Preferred/LEDPA corridor will not be made until after USACE has applied the Section 404(b)(1) guidelines to a submitted permit application and completed the public interest review process for the proposed project.

The SCDOT and NCDOT considered all available project data collected through the project development and design processes including traffic operations analyses, natural environmental impact data, human environment impact data, roadway design data, preliminary cost estimates, and public input to compare and contrast the Detailed Study Alternatives.

Alternative 4 has the lowest number of residential displacements, estimated to be 39, and the lowest number of identified noise receptor impacts (along with Alternative 4A) among the Detailed Study Alternatives. All of the Detailed Study Alternatives cross the 100-year floodplain in North Carolina. In comparison to the other Detailed Study Alternatives, Alternative 4 has moderate impacts to the 100-year floodplain. Other resources impacted, such as wetlands and streams, are also considered moderate in relation to the other Detailed Study Alternatives, although the expected linear feet of High-Quality Waters (HQWs) impacted is high.

After considering the impacts and the potential to further minimize some of the impacts following public involvement, SCDOT and NCDOT agreed that Alternative 4 is the Preferred Alternative for each agency.

S.7 Construction Phase 1 Scenarios

The proposed Carolina Bays Parkway Extension project is considered a Major Project by the FHWA because the projected cost of the project exceeds $500,000,000. As such, a Financial Plan is required to ensure that the necessary financial resources are identified, available, and managed throughout the life of the project. The proposed Carolina Bays Parkway Extension project is currently funded in the SCDOT 2024-2033 STIP (Project P029554), with right-of-way acquisition planned to begin in 2026 and construction in 2028. The proposed project is not, however, currently funded for right-of-way or construction in the NCDOT 2024-2033 STIP (Project R-5876).

Currently NCDOT has not identified the financial resources to construct the Carolina Bays Parkway Extension project in its entirety within North Carolina. Therefore, the overall project will be constructed in phases. A first construction phase, Construction Phase 1, has been identified and involves construction of the proposed project from the southern terminus at SC 9 near Little River to just across the North Carolina/South Carolina border in western Brunswick County along the alignment of one of the Detailed Study Alternatives described in Section 2.3. Subsequent construction phases have not yet been identified.

Two scenarios for the completion of Construction Phase 1 (CP1 – S1 and CP1 – S2) have been developed and are evaluated in this DEIS. CP1 – S1 and CP1 – S2 are described in detail in Chapter 2. Each of the seven Detailed Study Alternatives can be constructed with either Construction Phase 1 scenario. The basic difference between the two scenarios is that CP1 – S1 would consist of constructing the first phase of the project from SC 9 to S-111 (entirely within South Carolina), whereas CP1 – S2 would terminate in western Brunswick County in North Carolina. Both CP1 – S1 and CP2 – S2 include improvements to existing roadways in the project study area outside of the corridors for the Detailed Study Alternatives. The impacts summarized in Table S-1 for each of the seven Detailed Study Alternatives include the impacts resulting from both Construction Phase 1 scenarios. The total cost of CP1 – S1 is estimated to be $195.7 million, and the total cost of CP1 – S2 is estimated to be $318.9 million. The cost estimates for both Construction Phase 1 scenarios are based on using the alignment for Alternative 4 (SCDOT/NCDOT Preferred).

S.8 Unresolved Issues

Unresolved issues to be addressed prior to the publication of the Final Environmental Impact Statement (FEIS) include:

- Completion of detailed archaeological surveys for the Applicant's Preferred/LEDPA corridor pursuant to Section 106 of the National Historic Preservation Act and the guidelines issued by the Advisory Council on Historic Preservation, as requested by the North Carolina State Historic Preservation Officer (HPO) in October 2017 in response to the August 2017 project scoping letter (see correspondence in Appendix B). The results of these archaeological surveys will be discussed in the FEIS.
- As currently designed, the improved Carolina Bays Parkway Extension/SC 9 interchange with all of the Detailed Study Alternatives would require the relocation of the Santee Cooper electric substation for the Bay Tree subdivision in Horry County. The substation is located on Gusta Road in the southeast quadrant of the existing interchange. The Carolina Bays Parkway Extension/SC 9 interchange design will be reevaluated to minimize impacts to the substation.

S.9 Actions Required by Other State and Federal Agencies

All of the proposed Detailed Study Alternatives would require environmental regulatory permits from the US Army Corps of Engineers (USACE), the SC Department of Health and Environmental Control (SCDHEC), and the NC Division of Water Quality (NCDWQ).

- A Section 404 Permit from the USACE is required for any activity occurring in water or wetlands that would discharge dredged or fill material into Waters of the United States and adjacent wetlands. An individual Section 404 permit will be required. The USACE will determine final permit requirements.

- A Section 401 Water Quality Certification from SCDHEC and NCDWQ is required for activities that may result in discharge to Waters of the United States to certify that the discharge will be conducted in compliance with applicable state water quality standards. The Section 401 Water Quality Certification will be required prior to issuance of the Section 404 permit.

The proposed project will require a NC Coastal Area Management Act (CAMA) consistency determination or a Major Permit from the North Carolina Division of Coastal Management. It will also require a Coastal Zone Consistency Certification from SCDHEC Ocean and Coastal Resource Management in accordance with South Carolina's Coastal Zone Management Plan and Coastal Zone Management Act.

Additional coordination with the US Fish and Wildlife Service (USFWS) will be required regarding Section 7 compliance.

The project will be developed in compliance with Section 106 of the Historic Preservation Act of 1966 and Section 4(f) of the USDOT Act of 1966, as appropriate, in coordination with the FHWA, the North Carolina Department of Cultural Resources – State Historic Preservation Office, and the South Carolina Department of Archives and History – State Historic Preservation Office.

1.0 Purpose of and Need for Project

South Carolina Department of Transportation (SCDOT) State Transportation Improvement Program (STIP) Project P029554 and North Carolina Department of Transportation (NCDOT) STIP Project R-5876 involve the construction of the proposed Carolina Bays Parkway Extension. The SCDOT portion is within Horry County, South Carolina, and the NCDOT portion is within Brunswick County, North Carolina. These projects are included in the SCDOT 2024-2033 STIP and the NCDOT 2024-2033 STIP, respectively. This Draft Environmental Impact Statement (DEIS) is being prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended (42 United States Code 4321-4327), as codified in Title 40 of the Code of Federal Regulations Parts 1500-1508 and the North Carolina Environmental Policy Act (SEPA) of 1971, as amended (North Carolina General Statutes Article I Chapter 113A), as codified in the North Carolina Administrative Code, Title 1, Chapter 25. The DEIS is intended for use as an informational document by the decision-makers and the public. As such, it represents a disclosure of relevant environmental information concerning the proposed action.

The content of this DEIS conforms to the procedural provisions of NEPA and the United States Army Corps of Engineers (USACE) Public Interest Review.

1.1 Proposed Action

SCDOT STIP Project P029554 proposes to extend Carolina Bays Parkway (SC 31) from its current northern terminus at SC 9 in Horry County, South Carolina to the North Carolina State Line. NCDOT STIP Project R-5876 proposes to continue the Carolina Bays Parkway Extension from the South Carolina State Line to the US 17 Shallotte Bypass in Brunswick County, North Carolina. The Carolina Bays Parkway Extension is proposed to be a four-lane, full control of access freeway, part on new location.

The project vicinity and study area are shown on Figure 1. The study area boundaries roughly follow NC 130 (Whiteville Road) to the north, SC 9 to the south, US 17 to the east, and environmentally sensitive areas surrounding the Waccamaw River to the west. The study area boundary was established with consideration given to the ability to develop a full range of alternatives, while also minimizing potential impacts to important environmental features.

1.1.1 Project Setting

1.1.1.1 Description of Project Study Area

The proposed Carolina Bays Parkway Extension project is located in the coastal region of Horry County, SC and Brunswick County, NC. The project vicinity is a major destination for recreation, tourism, and retirement living in both states. The study area is largely comprised of unincorporated areas in Horry and Brunswick Counties, but contains portions of some small coastal towns and communities located on the inland side of the Intracoastal Waterway.

Horry County

Horry County, SC is one of five counties bordering the Atlantic Ocean in the state, and the proposed project is located near the northern edge of the Grand Strand/Myrtle Beach region. The Grand Strand has historically been a primary destination for coastal tourism and recreation in the state due to its

geographic proximity and accessibility from inland regions. Over time, it has evolved and diversified to become a major economic hub for the state. Its regional economy remains rooted in the recreation and tourism industries but has expanded to serve a year-round market, fueling growth of secondary markets and industry diversification. Regional accessibility has also evolved over time to include two high-speed freeways, SC 31 and SC 22, connecting the Grand Strand region to points south and west within South Carolina.

Little River is the densest population center within the Horry County portion of the study area. This section of the US 17 corridor is the most densely developed part of the study area and carries some of the highest traffic volumes. Although it is an unincorporated community, it is recognized as a US Census Designated Place (CDP) with an estimated 2020 population of 11,711. The Little River waterfront is a primary commercial tourism resource and destination in the area.

SC 9 is the main east-west connection serving the Horry County portion of the study area. The development pattern is moderately dense and contains a wide mix of uses that have been developed incrementally over a long period of time. Existing uses include residential subdivisions of varying densities, as well as similar in age commercial, industrial, service-oriented, institutional, and recreational uses. Recent development activity along the corridor includes the Seacoast Medical Center located just west of the US 17 interchange.

The area north of SC 9 and south of Little River Road contains predominantly residential uses that include a mix of more recently developed subdivisions and older single-family homes, as well as intermittent commercial, institutional (primarily churches), and light industrial uses clustered near intersections. Between Little River Road and the state line, agriculture is the predominant use, along with intermittent single family residential development.

Brunswick County

Brunswick County, NC is one of eight counties bordering the Atlantic Ocean in the state, nearly all of which have developed coastal waterfronts and beach communities with similar tourism-based economies. The geography and accessibility of area beaches have been the primary influences on historic patterns of growth and development in the county. Proximity to the City of Wilmington (New Hanover County) to the north, a port city with an economy rooted in commerce and tourism, has increasingly influenced growth in the northern parts of Brunswick County. This part of the county has evolved into a bedroom community of Wilmington and remains the fastest growing area in the county. The beaches and inland communities of southern Brunswick County are more remote. This has contributed to a low-density pattern of development focused on agriculture and small coastal towns served by a road network that was not originally designed to provide high-speed connections. Area amenities contribute to a quality of life that has proven increasingly attractive for retirees. As a result, areas in southern Brunswick County have seen substantial growth of the residential market as retirees have migrated to the area. Particularly notable residential growth has occurred in the Town of Carolina Shores and the Town of Shallotte, where the number of housing units more than doubled between 2000 and 2020.

The large majority of the Brunswick County portion of the study area lies within the county's unincorporated jurisdiction. The dominant development pattern includes low density commercial and industrial uses along the US 17 corridor, along with a mix of rural residential and agriculture uses along other secondary routes.

Located just north of the state line, Carolina Shores had an estimated 2020 population of 4,588. The town extends south of the US 17 corridor to the NC 179 corridor. The town's extraterritorial municipal jurisdiction (ETJ) extends north from US 17 toward Hickman Road. The town became incorporated in 1998, before which it was within the Town of Calabash. Carolina Shores is largely comprised of residential subdivisions.

The Town of Shallotte is centrally located in Brunswick County and serves as the primary commercial, service, and employment destination for residents of southern and western portions of the county, including the Brunswick County portion of the study area. The Town of Shallotte contains approximately 28 square miles and had an estimated 2020 population of 4,185.

1.1.1.2 Existing Roadway Facilities

Within the proposed Carolina Bays Parkway Extension study area, the existing primary road network includes US 17 and various North Carolina and South Carolina state highways and secondary routes. There are no interstate facilities within the study area. With the exception of SC 31 and US 17 Shallotte Bypass, access along existing routes within the study area is largely uncontrolled. The major facilities within the study area (SC 9, SC 31, and US 17) are designated as Strategic Corridors in North Carolina and South Carolina (see Exhibit A).

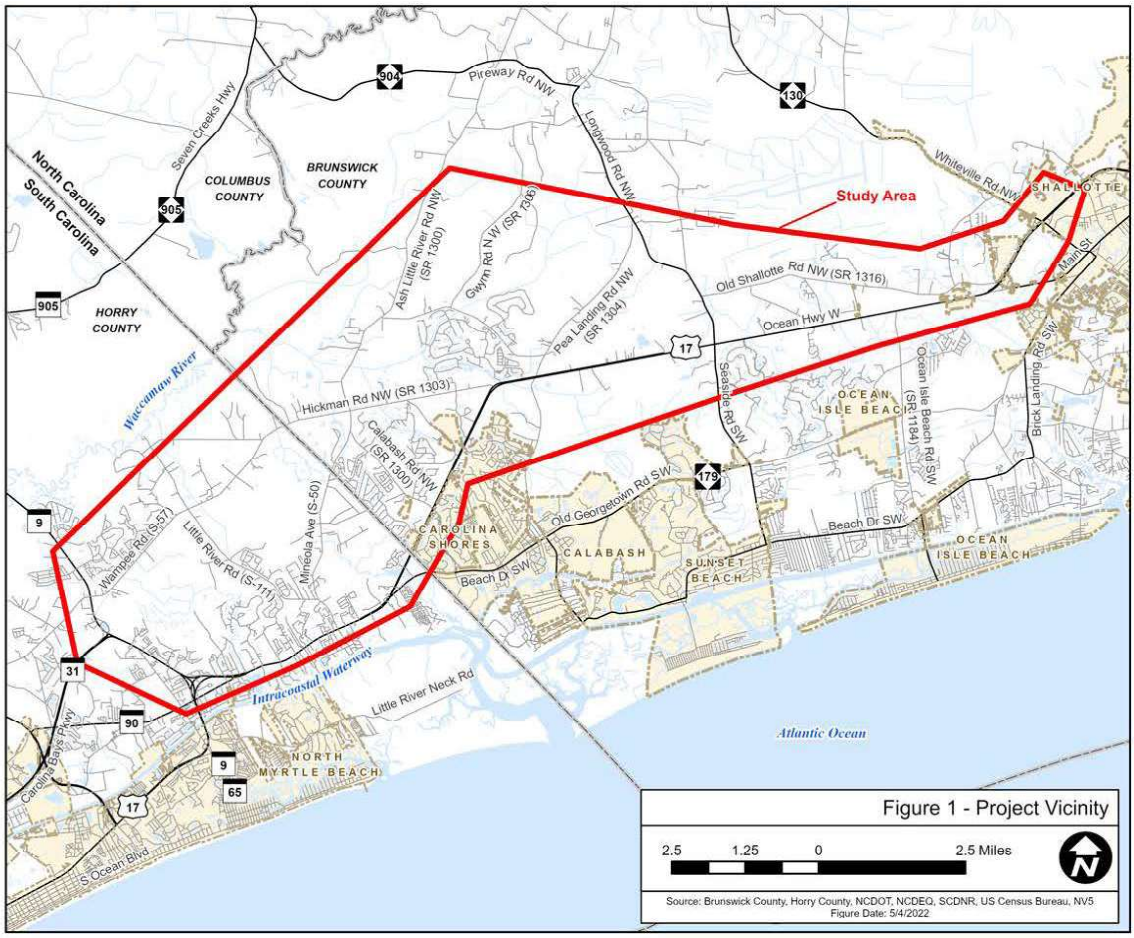

Exhibit A. Study Area Existing Roadway Facilities

North Carolina's Strategic Transportation Corridors form the core network of multimodal passageways. The 25 Strategic Transportation Corridors move large volumes of people and freight across the regions of the state and to key markets outside the state. The transportation facilities and services within the corridors connect centers of economic activity of statewide and regional significance. Preserving the physical condition of these facilities and the quality of the service they provide supports North Carolina's goals for economic development and will guide long-term planning at statewide, regional, and corridor levels. These strategic corridors are considered the state's highest priority when analyzed within the framework of regional or local transportation plans.

The purpose of South Carolina's Statewide Strategic Corridor Network is to provide a connected, continuous network that serves the traveling public and movement of freight. The benefit for having the Statewide Strategic Corridor Network is to develop a focused strategic system which will provide the needed connectivity to allow South Carolina to maintain and enhance its economic vitality. The South Carolina primary and secondary roadway network is classified into three tiers using the following conditions:

- Tier 1: The Tier 1 Corridors include roadways that meet any of the baseline criteria AND receive a high cumulative score for the evaluation criteria in step 1.
- Tier 2: The Tier 2 Corridors include roadways that meet any of the baseline criteria AND receive a medium cumulative score for the evaluation criteria in step 1.
- Tier 3: The Tier 3 Corridors include roadways that meet any of the baseline criteria AND receive a low cumulative score for the evaluation criteria in step 1. In addition, the Tier 3 corridors also include roadways that do not meet any of the baseline criteria AND receive a high cumulative score for the evaluation criteria in step 1.

US 17 is a principal arterial that extends from Winchester, Virginia to Punta Gorda, Florida. The cross-section along US 17 varies within the study area, from a four-lane, median-divided facility to a five-lane facility with a two-way center-turn lane (TWCTL). The posted speed limit ranges from 45 miles per hour (mph) to 60 mph. Land use along US 17 includes commercial, residential, institutional, and open space within the study area.

US 17 is included in the National Highway System (NHS) as a Non-Interstate Strategic Highway Route. US 17 is listed on the Strategic Highway Network (STRAHNET), a system of roads deemed necessary for mobilization and movement of commodities supporting U.S. military operations. US 17 is included in the South Carolina Strategic Corridor Network as a Tier 1 Strategic Corridor and is an NCDOT Strategic Transportation Corridor (Corridor O), as well as a designated Hurricane Evacuation Route. In addition, the Grand Strand Area Transportation Study (GSATS) 2040 Metropolitan Transportation Plan Update (October 2017) identifies US 17 within the study area as part of the region's freight transportation system. Both South Carolina and North Carolina have developed Statewide Freight Plans in compliance with the Fixing America's Surface Transportation (FAST) Act. These plans inventory transportation assets that contribute to the movement of goods, develop strategies, and set performance measures for freight transportation goals. US 17 within the study area is part of South Carolina's Strategic Freight Roadway Network and North Carolina's Priority Highway Freight Network.

South Carolina

The existing section of **Carolina Bays Parkway (SC 31)** is a six-lane, fully access-controlled freeway that extends from SC 707 near Socastee to SC 9 in Little River, SC. Carolina Bays Parkway spans eastern inland

Horry County west of and parallel to both US 17 and the Intracoastal Waterway for approximately 28 miles. Construction of Phase III, which extended the southern terminus approximately 3.8 miles to SC 707, was completed in November 2019. Within the study area, the posted speed limit along SC 31 is 65 mph. SC 31 is included in the South Carolina Strategic Corridor Network as a Tier 3 Strategic Corridor. SC 31 is also included in the NHS as an Urban Principal Arterial – Other Freeways and Expressways.

SC 9 is a principal arterial that extends across the northern portion of much of South Carolina, from the North Carolina State Line north of Spartanburg, SC to Horry County. The cross-section along SC 9 varies within the study area, from a four-lane, median-divided facility to a five-lane facility with a TWCTL. The posted speed limit is 45 mph and land use along SC 9 includes commercial, residential, institutional, and open space within the study area. SC 9 is included in the South Carolina Strategic Corridor Network as a Tier 2 Strategic Corridor. SC 9 is also included in the NHS as an Urban Principal Arterial – Other, and is a designated hurricane evacuation route.

Wampee Road (S-57) is a major collector that extends from Wampee, SC to the North Carolina State Line. Within the study area, Wampee Road is a two-lane roadway with a posted speed limit of 45 mph. Land use along Wampee Road includes commercial, residential, institutional, and open space.

Sea Mountain Highway (S-20) is a minor arterial that extends from SC 9 to SC 65. Within the study area, Sea Mountain Highway is a two-lane roadway with a posted speed limit of 45 mph. Land use along Sea Mountain Highway includes commercial, residential, institutional, and open space.

Little River Road (S-111) is a major collector that extends from Illman Road to Mineola Avenue. Within the study area, Little River Road is a two-lane roadway with a posted speed limit of 45 mph. Land use along Little River Road is primarily residential and open space.

SC 90 is a minor arterial that extends from US 501 Business in Red Hill, SC to US 17 in Little River, SC. Within the study area, SC 90 is a two-lane roadway with a posted speed limit of 45 mph. Land use along SC 90 includes commercial, residential, institutional, and open space.

Mineola Avenue (S-50) is a major collector that extends from the North Carolina State Line to US 17. Within the study area, Mineola Avenue is a two-lane roadway with a posted speed limit of 35 mph. Land use along Mineola Avenue is primarily residential and open space.

North Carolina

NC 904 (Longwood Road/Seaside Road) is a major collector that extends from Main Street in Fair Bluff, NC to First Street in Ocean Isle Beach. It is a two-lane roadway with a posted speed limit of 55 mph. Land use along NC 904 is primarily residential and open space within the study area.

Hickman Road (SR 1303) is a major collector that extends from US 17 to the South Carolina State Line. It is a two-lane roadway with a posted speed limit of 55 mph. Within the study area land use along Hickman Road is primarily residential and open space.

Calabash Road (SR 1300) is a minor collector that extends from Ash Little River Road to US 17. It is a two-lane roadway with a posted speed limit of 55 mph. Land use along Calabash Road is primarily residential and open space within the study area.

Ash Little River Road (SR 1300) is a minor collector that extends from Calabash Road to NC 130 (Whiteville Road) in Ash, NC. It is a two-lane roadway with a posted speed limit of 55 mph. Land use along Ash Little River Road within the study area is primarily residential and open space.

Ocean Isle Beach Road (SR 1184) is a major collector that extends from US 17 to Beach Drive. It is a two-lane roadway with a posted speed limit of 55 mph. Land use along Ocean Isle Beach Road includes commercial, residential, institutional, and open space within the study area. Ocean Isle Beach Road is also a designated hurricane evacuation route.

US 17 Business (Main Street) is a major collector that extends from US 17 west of Shallotte to US 17 east of Shallotte. The cross-section along US 17 Business varies, but it is primarily a three-lane roadway with a posted speed limit that ranges from 35 mph to 45 mph. All land use categories are present along US 17 Business as it runs through downtown Shallotte.

NC 130 (Whiteville Road) is a minor arterial from US 74 Business in Maxton, NC to US 17, and a major collector from US 17 to US 17 Business. Within the study area, the cross-section of NC 130 varies from a two-lane roadway to a three-lane roadway with a posted speed limit of 45 mph.

1.1.1.3 Relationship to Other Modes of Transportation

Airports

There are no airports or airfields located within the study area. The closest regional and international airports serving study area residents include:

- Odell Williamson Municipal Airport is located on NC 179 (Beach Drive SW) in Ocean Isle Beach, just off of US 17 to the south of the study area. Owned by the Town of Ocean Isle Beach, it is a single runway facility that is publicly owned and open to public use. US 17 provides the primary vehicular access to Odell Williamson Municipal Airport.
- Grand Strand Airport is located on Terminal Street (just off of US 17) in North Myrtle Beach, approximately 6.5 miles south of Little River. Owned by Horry County, it is a single runway facility that is open to public use. US 17 provides the primary vehicular access to Grand Strand Airport.
- Myrtle Beach International Airport is located south of the study area on Jetport Road (just off of US 17) in Myrtle Beach. The airport is approximately 25 miles from Little River and 45 miles from Shallotte. It is a primary commercial service airport with a single runway, owned and operated by Horry County. US 17 provides the primary vehicular access to Myrtle Beach International Airport from the northeast.
- Wilmington International Airport is located north of the study area in Wilmington (New Hanover County). The airport is approximately 40 miles north of Shallotte and 56 miles north of Little River. Owned by New Hanover County, the airport serves primarily commercial uses and has two runways. US 17 provides the primary vehicular access from the southwest to Wilmington International Airport.

Public Transportation

The Waccamaw Regional Transportation Authority (Coast RTA) provides regional public transportation services in Horry and Georgetown Counties, South Carolina, including 11 fixed route transit lines, paratransit services, and emergency management assistance. The fixed route system operates seven

days a week with stops near area employers, medical centers, hospitals, and entertainment attractions. Coast RTA also provides paratransit service to qualifying individuals with certified disabilities (physical or mental). Available services include point-to-point transportation by advanced reservation to and from any location within a ¾ mile radius of a Coast RTA fixed route. Currently, none of the Coast RTA fixed routes operate within a ¾ mile radius of the study area, thus paratransit services should not be using the existing transportation network within the study area. Coast RTA also provides emergency management assistance when a Mandatory Evacuation Order is issued by the Governor, becoming part of the Horry County Emergency Preparedness initiative to transport residents to local shelters. Emergency management assistance services provided by Coast RTA operate within the study area at two designated emergency evacuation bus stops: Food Lion on SC 9 in Little River and North Myrtle Beach High School on Sea Mountain Highway.

The Brunswick Transit System (BTS) provides non-emergency transportation services to the general public of Brunswick County and, through contract, to human service agency clients in Brunswick County. BTS does not offer fixed route service and requires passengers to schedule a trip at least 48 hours in advance. Services are open to any member of the public, with one-way fares ranging from $1.50 to $5.00, depending on the distance traveled. BTS operates Monday-Friday, from 7:00 a.m. to 4:00 p.m. and offers service to New Hanover County (Wilmington) on Tuesdays and Thursdays.

Existing Pedestrian and Bicycle Facilities

The large majority of routes within the study area do not currently include dedicated bicycle and pedestrian facilities and observed activity was limited during field review. Existing sidewalks in the vicinity of the study area are limited to a few non-residential areas where the existing development pattern supports pedestrian use, including a portion of US 17 through Little River, the Little River Waterfront area, and NC 179 (Beach Drive/Old Georgetown Road) through Calabash, and in residential subdivisions where infrastructure is generally owned and maintained by Property Owners Associations (POAs). Existing greenway/multi-use paths within the study area are limited to parks and other recreational properties.

There is no dedicated bicycle access along existing facilities in the vicinity of the study area; however, there are state designated bicycle routes (discussed below) and a number of facilities documented as being used by local cyclists throughout the study area. Routes used by local cyclists include: Calabash Road/Ash Little River Road, Country Club Road (SR 1168), Persimmon Road (SR 1167), Seaside Road SW (NC 904), Old Georgetown Road, Russtown Road (SR 1315), Old Shallotte Road (SR 1316), McMilly Road (SR 1320), and Main Street (US 17 Business).

NC Bicycle Route 3 (Ports of Call) is a state-designated route that passes through Brunswick County just south of the study area, following Beach Drive SW (NC 179/NC 179 Business/NC 904) and Hale Swamp Road (SR 1154) from the South Carolina State Line to Shallotte. A number of additional routes in the North Carolina portion of the study area have been identified for use by local cyclists and bicycle advocacy groups in the Cape Fear Regional Bicycle Plan (2017).

Railroads

The study area is not currently served by passenger or freight rail service, and there are no existing railroad facilities in the vicinity of the project study area.

Ports

The North Carolina State Ports Authority-operated Port of Wilmington is located approximately 37 miles north of the proposed project's northern terminus at US 17 Shallotte Bypass near Shallotte. The North Carolina State Ports Authority's two port facilities (Wilmington and Morehead City) support almost 88,000 jobs directly or indirectly across North Carolina (ITRE, 2018). The Port of Wilmington is North Carolina's largest port facility and it contributes approximately $12.9 billion annually to North Carolina's economy based on the goods moving through the port. US 17 provides the primary vehicular access to the Port of Wilmington from the southwest.

The South Carolina State Ports Authority-operated Port of Georgetown is located approximately 60 miles south of the proposed project's southern terminus at SC 9 near Little River. The total annual economic impact resulting from all activities associated with the South Carolina State Ports Authority's two port facilities (Charleston and Georgetown) on the state of South Carolina is estimated to be approximately $63.4 billion (University of South Carolina, 2019). This impact creates nearly 225,000 jobs and $12.8 billion in labor income for South Carolina residents. The Port of Georgetown serves as South Carolina's dedicated port for individually packaged (breakbulk) cargo. US 17 provides the primary vehicular access to the Port of Georgetown from the northeast.

1.1.2 History of Project

The concept for the Carolina Bays Parkway Extension dates back to the early 1990s. It has been included in various studies and plans prepared by entities in both North Carolina and South Carolina. In some of these studies the Carolina Bays Parkway Extension was included as part of a larger project, while in others only a portion of the project was evaluated.

In South Carolina, various local government stakeholder groups and organizations began considering a major road improvement plan for the Grand Strand Region beginning in the 1980s. The *North-South Corridor, Horry County, South Carolina – Conceptual Route Plan* (1989) was prepared by the Waccamaw Regional Council of Governments in 1989 with funding from the Grand Strand Regional Tourism Program. The plan evaluated a north-south corridor west of the Intracoastal Waterway between SC 90 and SC 544. With a lack of funding and a number of other higher priority transportation projects in the region slowing progress on the North-South corridor, the Carolina Bays Task Force was formed out of local citizen and stakeholder support for the project. The *Carolina Bays Task Force Conceptual Criteria Report* (1991) was prepared, identifying the general extent and location of the future parkway: Phase I of the project would extend from SC 9/SC 90 to SC 544, with future phases extending southward to US 701 and/or US 17 near the City of Georgetown, and northward to the North Carolina State Line. The *Carolina Bays Parkway Feasibility Study* (1993) was prepared at the recommendation of the Task Force report. The feasibility study resulted in expansion of the project limits to include the entire GSATS Metropolitan Planning Organization (MPO) boundary, which generally extended from Georgetown, SC to the North Carolina State Line at the time, and concluded the future parkway would improve emergency evacuation and mobility in the region and would be a logical investment from a travel efficiency/economic standpoint. The Final Environmental Impact Statement (FEIS) was prepared in 1998, recommending an alignment that extends for approximately 30.2 miles along the mainline from US 17 just north of Glenn's Bay Road to SC 9. In 2001, SCDOT began considering a direct link into North Carolina and initiated a feasibility study of alternatives for the approximately five-mile section between SC 9 and the North Carolina State Line.

The historically proposed I-74 corridor project in North Carolina (NCDOT Project R-3436), extending from US 74/76 in Columbus County to the South Carolina State Line in Brunswick County, was studied by NCDOT beginning in the 1990s. The original feasibility study for R-3436 was completed by NCDOT in 1997. In 2004, the future I-74 corridor was adopted as a Strategic Highway Corridor (SHC) by the NC Board of Transportation. Following the SHC designation, NCDOT entered into a joint agreement with SCDOT to expand the limits of the Carolina Bays Parkway Extension Feasibility Study that was already underway into Brunswick County. Also following the SHC designation, NCDOT completed a re-evaluation of the original R-3436 Feasibility Study in 2005. The re-evaluation was updated a final time in 2007 for consistency with findings of the joint NCDOT-SCDOT *Carolina Bays Parkway Extension Feasibility Study Report* (2006) following its completion. The 2006 Feasibility Study evaluated the extension of Carolina Bays Parkway from SC 9 in Horry County, SC to NC 904 in Brunswick County, NC.

As discussed in the GSATS MPO *2040 Metropolitan Transportation Plan Update* (2017), the Carolina Bays Parkway Extension from SC 9 to US 17 in North Carolina is a committed project that is partially funded as part of the Horry County Road Improvement and Development Effort (RIDE) III referendum. According to the SCDOT 2024-2033 STIP, the South Carolina portion of the proposed project is being funded locally with a Horry County sales tax ($5.5 million for right-of-way in 2026 and $209 million for construction in 2028), as well as by an earmark from the Highway Infrastructure Program (HIP) ($22 million for right-of-way in 2026). The North Carolina portion of the Carolina Bays Parkway Extension is included in the NCDOT 2024-2033 STIP, but is currently unfunded for right-of-way or construction. NCDOT will determine options for financing the proposed project in North Carolina, and the financial plan will be included in the FEIS.

1.2 Purpose of Proposed Action

The National Environmental Policy Act (NEPA)/Section 404 Merger Team (Merger Team) concurred on the purpose of and need for the proposed project at the March 19, 2019, Concurrence Point 1 (Purpose and Need and Study Area Defined) (CP 1) meeting, and a copy of the signed concurrence form is included in Appendix B. The Merger Team agreed upon the following purpose statement for the proposed project:

> The primary purpose of the project is to improve the transportation network in the study area by enhancing mobility and connectivity for traffic moving in and through the project area.
>
> Mobility refers to the movement of people or goods. Potential measures of performance for evaluating an improvement in mobility in the project area are travel time, travel speed and level of service (LOS). SCDOT has established the LOS goal of C for their state roads while NCDOT has established the target goal of LOS D for system level planning analysis.
>
> Connectivity refers to the density of connections in road networks and the directness of links. Potential measures of performance for evaluating improvements in connectivity are reduced travel times and enhanced route options for travelers, service providers, and the transport of goods.

LOS is a quality measure describing operational conditions within a traffic stream, generally in terms of such service measures as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. There are six levels of service, A (highest) through F (lowest). For roadways, LOS A indicates no congestion while LOS F represents more traffic demand than road capacity and

extreme delays. As stated above, SCDOT has established the LOS goal of C for their state roads while NCDOT has established the target goal of LOS D for system level planning analysis.

1.3 Need for Proposed Action

At the March 19, 2019, CP 1 meeting, the Merger Team agreed upon the following summary of need for the proposed action (see signed concurrence form in Appendix B):

> Many intersections and roadway segments in the study area are expected to either approach or exceed the roadway capacity limits in 2040. The population within Horry and Brunswick counties has steadily increased, and is expected to continue to increase, along with the number of tourists to the area. Growth in population, tourism, and supporting services has resulted in an increase in mixed-purpose traffic on area roads.

Sections 1.3.1 through 1.3.4 below provide a more detailed discussion of the need for the proposed Carolina Bays Parkway Extension in terms of the problems that need to be addressed in the study area, including supporting traffic operations and transportation demand technical data for existing and forecasted conditions in the project study area.

1.3.1 Summary of Problems Needed to be Addressed by Proposed Action

The proposed project is needed to address the following problems within the study area:

- **Deteriorating Quality of Traffic Service**

Within the proposed Carolina Bays Parkway Extension study area, the existing primary road network includes US 17 and various North Carolina and South Carolina state highways and secondary routes. With the exception of the existing portion of SC 31 in Horry County and US 17 Shallotte Bypass in Brunswick County, access along existing routes within the study area is largely uncontrolled. With very few direct, access-controlled options available through the rapidly developing project study area, mobility is limited for both local and through traffic who currently use the same roadway system that services both extra-regional through and local traffic. The substantial volumes of tourist and coastal truck traffic travelling through the area currently must use congested existing roadways with numerous signalized intersections, side streets, and driveways servicing local traffic. The project will provide a more direct route for traffic travelling through the area by strategically controlling the access points to local destinations, allowing the existing transportation routes to convey shorter local trips more efficiently.

Since traffic level of service is a measure of performance for mobility, the additional traffic carrying capacity provided by the proposed project will help to improve level of service, reflecting improved mobility, on the project study area's roadway network. Traffic volume forecasts show that traffic volumes on many roadway facilities within the study area are expected to increase considerably by 2045. In several locations, the Average Annual Daily Traffic (AADT) volumes and Average Summer Weekday Traffic (ASWT) volumes for existing intersections and roadway segments are forecast to increase by 25 percent or more from the 2019 base conditions by 2045. As a result, many existing intersections and roadway segments would either approach or exceed the roadway capacity limits in 2045. The proposed project will provide needed additional traffic carrying capacity on the project study

area's roadway network, thereby enhancing mobility as indicated by improved level of service. For a detailed analysis of the deteriorating traffic carrying capacity, refer to Section 1.3.3.

- **Increasing Mixed-Use Transportation Demand on Existing Roadway Network**

The population within Horry and Brunswick Counties has steadily increased along with the number of tourists to the area. Tourists and visitors are important to the economic vitality of both states' coastal counties. U.S. Census Bureau statistics indicate countywide growth rates between 2000 and 2010 were 37.0 percent in Horry County and 46.9 percent in Brunswick County. Between 2010 and 2020, countywide growth rates were 30.4 percent in Horry County and 27.2 percent in Brunswick County. Based on current data available from State Demographers in both South Carolina and North Carolina, both counties are expected to continue to experience high growth rates through the year 2035. Growth in the mixed-purpose traffic associated with increased population, tourism, and supporting services (in particular trucks) has resulted in increased transportation demand on area roadways. The increased traffic in the project area is straining the ability of the existing roadway infrastructure to effectively serve extra regional and local trips, as discussed in Section 1.3.3.3. The strain on the existing roadway infrastructure is expected to worsen with the projected local traffic demand associated with population increases in Horry and Brunswick Counties. Interstate freight demand along the east coast is also expected to increase. The combined increase in interstate freight along with the increasing local traffic component is expected to eventually overwhelm the existing roadway system if improvements are not made.

The proposed project is included in the 2040 GSATS Metropolitan Transportation Plan Update's (October 2017) new construction recommendations for South Carolina as the Extension of SC 31 (Carolina Bays Parkway) to US 17 in North Carolina (Wampee Road/Hickman Road improvements) and for North Carolina as a proposed new freeway from US 17 (Shallotte Bypass/Seaside) to the South Carolina State Line. The GSATS 2019-2028 TIP includes the North Carolina portion of the proposed Carolina Bays Parkway Extension as its number one priority project and would improve connectivity by connecting two access-controlled facilities (i.e., existing Carolina Bays Parkway and the US 17 Shallotte Bypass) and providing an option to separate extra-regional travelers from those with local trip destinations.

1.3.2 Potential Additional Benefits of the Project

By improving mobility and roadway connectivity in the project study area, the proposed project offers the potential to support more efficient clearance times during emergency evacuations.

1.3.3 Traffic Operations Analyses

1.3.3.1 Analysis Methodology

The objective of the traffic operations analysis is to evaluate the existing and future travel conditions and to assess the effectiveness of the proposed Carolina Bays Parkway Extension in improving traffic flow within the project study area. This section analyzes existing conditions and projected future traffic conditions on the existing road network absent of any improvements. The analysis of future build travel conditions is discussed in Section 2.8.

An initial traffic forecast was prepared for the project in July 2017 for the 2016 Existing and the 2040 Future Year No-Build scenarios. The July 2017 traffic forecast provided traffic volumes in terms of Average Annual Daily Traffic (AADT). However, because of the seasonal nature of the study area, the traffic forecast was updated in September 2018 to include Average Summer Weekday Traffic (ASWT) volumes for both the 2016 Existing and 2040 Future Year No-Build scenarios. For this forecast, ASWT represents average weekday traffic (Monday to Friday) for June, July, and August (i.e., peak tourist season), and these traffic volumes are substantially higher than the AADT volumes in most locations. The ASWT volumes forecast is provided to allow an analysis of study area existing roadway capacity with the heaviest traffic volumes of the year. In October 2020, an updated traffic forecast was prepared for the proposed project for the 2019 Existing and the 2045 Future Year No-Build scenarios. Once again, the October 2020 traffic forecast provided traffic volumes in terms of AADT and ASWT volumes.

The traffic forecasts were prepared using output from the Grand Strand Area Transportation Study (GSATS) Metropolitan Planning Organization's (MPO) 2040 Travel Demand Model. The traffic forecasts are based on the latest official travel demand model. The travel demand model uses various socioeconomic data to forecast growth in order to predict demands on the transportation network. As the regional growth expectations are anticipated to be the same either with or without the project, the socioeconomic data used in the model is the same for the No-Build and Build scenarios. Regional growth expectations help to determine projected traffic in a specified horizon year. Assumptions about future development activity and changes in distribution of population and employment in the forecast study area are implicit in the model. Expectations regarding specific developments can be a factor in the development of the forecast. It is anticipated there will be periods where housing and employment market trends will fluctuate up and down through the horizon year. The future year No-Build scenario assumes completion of all projects in the fiscally constrained GSATS MPO 2040 Metropolitan Transportation Plan Update adopted in October 2017.

An initial traffic capacity analysis was completed in May 2018 for the 2016 Existing and 2040 Future Year No-Build scenarios using AADT volumes. Synchro and SimTraffic were used to analyze study area signalized and unsignalized intersections. Although SC 31 is the only existing freeway facility, there are several interchanges within the study area. For these locations, Highway Capacity Software (HCS7) analyses were performed for the 2016 Base Year No-Build and 2040 Design Year No-Build scenarios. The intersection and interchange analyses were based on NCDOT's Congestion Management Analysis Guidelines.

As stated previously related to the traffic forecasts, because of the seasonal nature of the study area, the traffic capacity analysis was also updated in January 2019 to include an analysis of summer conditions at signalized and unsignalized intersections using ASWT volumes. The updated 2019 analysis also included an analysis of study area arterials. The updated traffic capacity analysis was completed using TransModeler software (Version 4). TransModeler is a microscopic simulation program that incorporates driver behavior, facility types, and a variety of other inputs to provide an array of Measures of Effectiveness (MOEs) for a given roadway network. Each of the TransModeler models used in the analysis was developed based on NCDOT's *Congestion Management Simulation Guidelines for TransModeler.*

MOEs are system-wide performance measures that enable one to assess the impacts of the proposed project improvements in comparison to the no-build scenarios described in this chapter, and there are a variety of MOEs available to be recorded using TransModeler. Control delay, LOS, and queue lengths are reported for at-grade intersections for this analysis. The LOS reported for this analysis is simulation-

based and calculated in a manner consistent with the Highway Capacity Manual (HCM) 2010 methodologies.

The *Carolina Bays Parkway Extension Traffic Operations Analysis Technical Memorandum (Build Conditions)* (Mott MacDonald, December 2022), appended by reference, updated the traffic capacity analysis for the No-Build scenarios to 2019 Existing and 2045 Future Year conditions using both AADT and ASWT volumes. The December 2022 updated traffic capacity analysis also used microscopic simulation of each of the No-Build scenarios in TransModeler software (Version 5).

The results of the 2022 traffic capacity analyses are presented in this document in terms of level of service (LOS), which is a qualitative measure that characterizes the operational conditions within a traffic stream and the perception of traffic service by motorists and passengers. The Transportation Research Board's Highway Capacity Manual generally describes these conditions in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. Six levels are used, ranging from A to F. For roadways, LOS A indicates no congestion while LOS F represents more traffic demand than road capacity and extreme delays. The engineering profession generally accepts LOS D as a minimally acceptable operating condition for signalized intersections. As stated previously, SCDOT has established a goal of LOS C for their state roads, while NCDOT has established the target goal of LOS D for system level planning analysis.

Traffic flow at an intersection is affected by the volume of traffic and by the intersection geometry. For signalized intersections, the capacity analysis determines the overall LOS for all intersection movements. LOS A represents no congestion, LOS E represents long delays, and LOS F represents excessive delays with vehicles having to wait several signal cycles to clear an intersection. For unsignalized intersections, the LOS represents the delay on the worst intersection approach during one of the peak hours.

1.3.3.2 Existing (2019) and Future (2045) No-Build Traffic Volumes

Table 1-1 summarizes the AADT and ASWT volumes in vehicles per day (vpd) for major study area roadways for both the 2019 Existing and 2045 Future Year No-Build scenarios, and these traffic volumes are shown on Figures 2 through 5.

Table 1-1. Existing (2019) and Future Year (2045) No-Build Traffic Volumes

Roadway Segment	2019 Base Year AADT[1] (vpd)	2019 Base Year ASWT[2] (vpd)	2045 Future Year AADT (vpd)	2045 Future Year ASWT (vpd)
South Carolina				
US 17 south of SC 90 to US 17 east of SC 179/Graystone Boulevard	14,700 – 44,200	17,400 – 50,500	23,100 – 59,500	27,400 – 67,800
S-57 (Wampee Road) west of SC 9 to S-57 east of S-111 (Little River Road)	7,400 – 15,000	8,000 – 16,900	13,700 – 19,900	15,000 – 22,400
SC 9 north of US 17 to SC 9 north of S-57 (Wampee Road)	26,400 – 36,000	30,600 – 40,600	33,300 – 49,100	38,700 – 55,400
Sea Mountain Hwy south of SC 90 to Sea Mountain Hwy south of SC 9	10,000 – 12,400	11,200 – 13,700	13,600 – 16,900	15,200 – 18,700
SC 31 west of SC 9	31,400	35,800	49,200	56,200
SC 90 west of US 17 to SC 90 west of Sea Mountain Highway	12,600 – 13,400	14,300 – 15,100	16,300 – 17,300	18,600 – 19,600
North Carolina				
US 17 west of Calabash Road/Country Club Drive to US 17 north of NC 130	15,000 – 32,300	17,000 – 36,400	23,000 – 40,700	26,100 – 45,900
SR 1303 (Hickman Road) west of SR 1300 (Ash Little River Rd/Calabash Road) to SR 1303 west of US 17	8,400 – 9,600	9,700 – 11,000	13,700 – 15,100	16,000 – 17,300
NC 904 (Seaside Road) south of US 17 to NC 904 (Longwood Road) north of SR 1304 (Pea Landing Road)	4,600 – 11,200	4,800 – 13,000	7,700 – 16,500	8,100 – 19,100
NC 130 west of US 17 SB ramps to NC 130 east of US 17 NB ramps	9,700 – 10,100	10,900 – 11,400	15,400 – 16,200	17,300 – 18,300

[1]Average Annual Daily Traffic
[2]Average Summer Weekday Traffic

1.3.3.3 Existing (2019) and Future (2045) No-Build Capacity Analysis

Table 1-2 summarizes the LOS and associated delay for major intersections within the study area for both the 2019 Existing and 2045 Future Year No-Build scenarios using both AADT and ASWT volumes. The LOS for study area intersections, interchanges, and roadways are shown on Figures 6 through 9.

Without improvements, the US 17 and Wampee Road/Hickman Road corridors are anticipated to experience a substantial degradation in traffic operations by 2045. In the 2045 AADT scenario, four signalized intersections are anticipated to operate at LOS E or F in at least one of the peak hours (compared to none in 2019), while nine unsignalized intersections are anticipated to have at least one of the stop-controlled movements operating at LOS E or F in at least one of the peak hours (compared to three in 2019). In the 2045 ASWT scenario, 11 signalized intersections (including a potential future signal at the US 17 southbound loop exit ramp/NC 130 intersection) are anticipated to operate at LOS E or F in at least one of the peak hours (compared to three in 2019), while ten unsignalized intersections (including a US 17 northbound U-turn east of Ocean Isle Beach Road) are anticipated to have at least one of the stop-controlled movements operating at LOS E or F in at least one of the peak hours (compared to five in 2019).

Table 1-2. Existing (2019) and Projected Future Year (2045) AADT and ASWT Intersection Level of Service

Intersection No.[1]	Intersection Name	Existing Intersection Control	Base Year 2019 (AADT) Delay in Seconds (LOS)[2]		Base Year 2019 (ASWT) Delay in Seconds (LOS)[2]		2045 No Build (AADT) Delay in Seconds (LOS)[2]		2045 No Build (ASWT) Delay in Seconds (LOS)[2]	
			AM	PM	AM	PM	AM	PM	AM	PM
South Carolina										
1	SC 9/S-57 (Wampee Rd)	Signalized	30.4 (C)*	30.1 (C)*	**47.9 (D)****	**56.4 (E)****	**126.1 (F)**	**101.9 (F)**	**173.4 (F)**	**177.6 (F)**
2	SC 9/SC 31	Interchange[3]	23.3 (C)	21.0 (C)	**29.2 (D)** Basic: SC 9 SB N. of SC 31 NB on-ramp to SC 9 NB	22.7 (C)	**59.9 (F)** Merge: SC 9 SB south of SC 31 NB on ramp	**52.1 (F)** Merge: SC 9 NB north of SC 31 NB on ramp	**74.6 (F)** Merge: SC 9 NB north of SC 31 NB on ramp	**123.8 (F)**
3	SC 9/Food Lion Dr/Sea Mountain Hwy	Signalized	23.4 (C)	27.2 (C)**	**36.4 (D)****	**62.1 (E)****	**127.9 (F)**	**148.9 (F)**	**110.8 (F)**	**239.8 (F)**
4	SC 9 SB Off Ramp/SC 90	Signalized	11.8 (B)*	10.6 (B)*	25.9 (C)	3.0 (A)**	**102.4 (F)**	**57.0 (E)****	**128.1 (F)**	**56.8 (E)****
5	US 17/SC 9 NB Off Ramp/SC 90	Unsignalized	**96.2 (F)**	**80.6 (F)**	**232.9 (F)**	**42.9 (E)**	**245.8 (F)**	**461.8 (F)**	0.2 (A)	**178.1 (F)**
6	US 17/SC 90/Fairway Dr	Signalized	21.2 (C)**	18.5 (B)**	19.4 (B)**	**41.8 (D)****	29.4 (C)**	**51.1 (D)****	**74.6 (E)****	**61.9 (E)****
7	US 17/River Hills Dr/ Coquina Harbor Dr	Signalized	10.2 (B)*	10.5 (B)**	11.0 (B)**	**77.5 (E)****	23.2 (C)**	21.8 (C)**	**72.9 (E)****	34.8 (C)**
8	US 17/Horseshoe Rd/ Baker St	Signalized	10.0 (A)**	12.9 (B)**	15.2 (B)**	**35.4 (D)****	31.8 (C)**	23.8 (C)**	**55.9 (E)****	**61.8 (E)****
9	US 17/Pinehurst Circle	Signalized	6.0 (A)**	4.7 (A)**	6.3 (A)**	7.5 (A)**	9.6 (A)**	8.4 (A)**	18.0 (B)**	**59.4 (E)****
10	US 17/S-50 (Mineola Ave)	Signalized	11.2 (B)*	11.7 (B)*	11.7 (B)*	15.3 (B)**	24.1 (C)**	26.7 (C)**	22.3 (C)**	**48.6 (D)****
11	US 17 SB/Heather Glen Way	Unsignalized	16.7 (C)	18.7 (C)	17.2 (C)	21.6 (C)	22.3 (C)	**123.8 (F)**	**76.0 (F)**	**665.7 (F)**
	US 17 NB/Heather Glen Way		21.4 (C)	18.1 (C)	**42.4 (E)**	11.7 (B)	**26.5 (D)**	**50.4 (F)**	**29.0 (D)**	**574.5 (F)**
14	US 17/Heather Lakes Dr/Pavilion Dr	Unsignalized	**31.0 (D)**	**39.5 (E)**	**30.9 (D)**	20.8 (C)	**40.0 (E)**	**88.5 (F)**	**519.5 (F)**	**133.0 (F)**
20	US 17/Graystone Blvd/ SC 179	Signalized	21.9 (C)	26.2 (C)	19.4 (B)*	**36.6 (D)***	23.7 (C)**	33.2 (C)**	**46.2 (D)****	**68.6 (E)****
21	S-57 (Wampee Rd)/ S-111 (Little River Rd)	Unsignalized	16.1 (C)	21.9 (C)	14.2 (B)	**160.2 (F)**	16.5 (C)	**145.2 (F)**	**54.0 (F)**	**632.8 (F)**
36	SC 90/Sea Mountain Highway	Signalized	**49.0 (D)****	**42.8 (D)***	34.7 (C)*	**44.6 (D)****	**112.1 (F)**	**83.9 (F)**	**175.8 (F)**	**96.6 (F)**

Table 1-2. Existing (2019) and Projected Future Year (2045) AADT and ASWT Intersection Level of Service (continued)

Intersection No.[1]	Intersection Name	Existing Intersection Control	Base Year 2019 (AADT) Delay in Seconds (LOS)[2]		Base Year 2019 (ASWT) Delay in Seconds (LOS)[2]		2045 No Build (AADT) Delay in Seconds (LOS)[2]		2045 No Build (ASWT) Delay in Seconds (LOS)[2]	
			AM	PM	AM	PM	AM	PM	AM	PM
37	SC 9/SC 90/US 17	Interchange[3]	**27.3 (D)** Basic: SC 9 SB south end segment	23.0 (C)	**29.6 (D)** Basic: SC 9 SB south of SC 9 SB off ramp	27.0 (C)	**32.3 (D)** Basic: SC 9 SB south end segment	**30.7 (D)** Diverge: SC 9 NB south of SC 9 NB ramp	**104.4 (F)** Basic: SC 9 SB basic segment	**100.8 (F)** Merge: SC 9 NB north of US 17 SB on ramp
North Carolina										
12	US 17/NC 904 (2019) | US 17 NB/NC 904 NB (2045)	Signalized	29.4 (C)**	28.2 (C)*	32.8 (C)*	29.2 (C)*	24.8[5] (C)	29.6[5] (C)*	34.7[5] (C)	30.7[5] (C)
	US 17 SB/NC 904 SB (2045)						22.4[5] (C)	15.5[5] (B)*	26.9[5] (C)**	16.4[5] (B)*
15	US 17/SR 1300 (Calabash Rd)/SR 1168 (Country Club Dr)	Signalized	30.1 (C)**	28.5 (C)*	30.9 (C)*	33.2 (C)*	**46.0 (D)****	**52.1 (D)****	**157.4 (F)**	**159.8 (F)**
16	US 17/SR 1167 (Persimmon Rd)	Unsignalized	12.3 (B)	12.9 (B)	15.6 (C)	10.6 (B)	22.4 (C)	20.6 (C)	24.2 (C)	**34.4 (D)**
17	US 17 SB/Hickman Rd	Unsignalized	**66.4 (F)**	**57.0 (F)**	**93.0 (F)**	**347.9 (F)**	**518.6 (F)**	**227.5 (F)**	**158.9 (F)**	**228.9 (F)**
	US 17 NB/Hickman Rd		15.7 (C)	13.0 (B)	17.2 (C)	12.4 (B)	22.5 (C)	17.0 (C)	**25.7 (D)**	16.4 (C)
18	US 17 SB/Middleton Dr	Unsignalized	14.1 (B)	15.1 (C)	**25.7 (D)**	19.9 (C)	**139.3 (F)**	**27.0 (D)**	**397.4 (F)**	**289.6 (F)**
	US 17 NB/Middleton Dr		21.0 (C)	15.2 (C)	**26.5 (D)**	17.1 (C)	**42.2 (E)**	24.2 (C)	**43.3 (E)**	**26.3 (D)**
19	US 17/SR 1304 (Pea Landing Rd)/SR 1165 (Thomasboro Rd)	Signalized	15.5 (B)*	13.0 (B)*	14.8 (B)*	12.8 (B)*	22.4 (C)**	29.2 (C)**	26.4 (C)**	**41.2 (D)****
22	SR 1303 (Hickman Rd)/ SR 1300 (Ash Little River Rd/Calabash Rd)	Unsignalized	20.1 (C)	18.0 (C)	**34.6 (D)**	**46.1 (E)**	**123.5 (F)**	**136.8 (F)**	**355.8 (F)**	**458.0 (F)**
23	SR 1303 (Hickman Rd)/ Crow Creek Dr	Unsignalized	10.3 (B)	14.1 (B)	15.2 (C)	17.2 (C)	13.0 (B)	14.3 (B)	13.6 (B)	16.1 (C)
31	US 17/SR 1319 (Union School Rd)	Signalized	0.1 (A)**	0.3 (A)**	0.2 (A)**	0.6 (A)**	1.9 (A)**	2.2 (A)**	3.0 (A)**	1.5 (A)**
32	US 17/SR 1184 (Ocean Isle Beach Rd)	Unsignalized	21.0 (C)	19.2 (C)	**27.5 (D)**	19.9 (C)	**27.9 (D)**	23.0 (C)	**47.9 (E)**	**30.0 (D)**

Table 1-2. Existing (2019) and Projected Future Year (2045) AADT and ASWT Intersection Level of Service (continued)

Intersection No.[1]	Intersection Name	Existing Intersection Control	Base Year 2019 (AADT)		Base Year 2019 (ASWT)		2045 No Build (AADT)		2045 No Build (ASWT)	
			Delay in Seconds (LOS)[2]				Delay in Seconds (LOS)[2]			
			AM	PM	AM	PM	AM	PM	AM	PM
33	US 17/Old Shallotte Rd/US 17 Bus (2019) | US 17 Bus WB/US 17 NB (2045)	Signalized	25.1 (C)*	23.6 (C)*	28.4 (C)	29.1 (C)**	23.1[6] (C)	28.7[6] (C)	27.7[6] (C)	29.5[6] (C)
	Old Shallotte Rd/US 17 SB (2045)						20.5[6] (C)	11.9[6] (B)	19.8[6] (B)	13.4[6] (B)
34	US 17 SB Loop/NC 130[4]	Unsignalized/ Signalized	13.5 (B)	13.1 (B)	17.6 (C)	19.0 (C)	18.4 (B)*	32.7 (C)*	22.5 (C)*	**71.5 (E)****
35	US 17 NB Loop/NC 130/Visitor Center[4]	Unsignalized/ Signalized	13.1 (B)	13.9 (B)	17.7 (C)	16.8 (C)	12.3 (B)*	8.3 (A)**	15.2 (B)*	17.4 (B)**
38	US 17/NC 130	Interchange[3]	14.0 (B)	11.1 (B)	14.8 (B)	12.8 (B)	13.7 (B)	16.5 (B)	15.4 (B)	**42.6 (E)** Diverge: US 17 SB north of US 17 SB loop
141	US 17 SB U-turn west of US 17/NC 904[5]	Signalized					19.8 (B)	27.6 (C)*	13.8 (B)	12.8 (B)
143	US 17 NB U-turn east of US 17/NC 904[5]	Signalized					18.5 (B)*	17.1 (B)*	24.1 (C)**	17.9 (B)
144	US 17 NB U-turn north of US 17/Old Shallotte Rd/US 17 Bus (Main St)[6]	Signalized					23.8 (C)*	21.9 (C)*	23.0 (C)*	17.2 (B)*
145	US 17 SB U-turn south of US 17/Old Shallotte Rd/ US 17 Bus (Main St)[6]	Signalized					21.4 (C)*	25.6 (C)*	20.0 (C)	31.5 (C)*

[1]Intersection numbers are shown on Figures 6 through 9.
[2]LOS and delay: (1) Unsignalized Intersections - LOS represents the worst approach during one of the peak hours; (2) Signalized Intersections - Overall LOS is presented for signalized intersections. Asterisks denote one or more approaches during one of the peak hours are LOS E (*) or LOS F (**); and (3) All Intersections – Shading is used to highlight unsignalized (i.e., for worst approach only) and signalized (i.e., for overall intersection) intersections identified in the table as operating at LOS D (blue shading), LOS E (orange shading), and LOS F (red shading).
[3]With the exception of the SC 9/SC 90/US 17 interchange for 2045 ASWT conditions, the majority of interchange segments analyzed operate with an acceptable LOS. The table shows the highest segment density and LOS presented for an interchange freeway type segment during AM and PM peak hours.
[4]Both of the US 17 ramp/NC 130 intersections are currently unsignalized; however, due to the extent of congestion observed in the initial 2045 No-Build analysis simulations, traffic signals at both of these intersections were included in the 2045 AADT and ASWT LOS analyses. Although no specific project has been identified at this time to provide these improvements, it is reasonable to assume they could be in place by the 2045 design year.
[5]This intersection is analyzed as part of the future superstreet at the US 17 and NC 904 intersection.
[6]This intersection is analyzed as part of the future superstreet at the US 17 and US 17 Business (Main Street)/Old Shallotte Road intersection.

The freeway segments associated with the interchanges are also anticipated to experience a degradation in LOS; however, to a lesser extent. Only two segments are anticipated to operate at LOS F in the 2045 AADT scenario, while six are anticipated to operate at LOS E or F in the 2045 ASWT scenario. It should be noted that two of these segments are associated with portions of SC 9 that have signalized intersections nearby that impact operations.

While both traffic volume scenarios (AADT and ASWT) show a degradation in traffic operations by 2045, the analysis shows the higher traffic volumes expected with the ASWT scenario will have a greater impact to the operations when comparing the 2019 Existing and 2045 Future Year No-Build scenarios. This is particularly true for the signalized intersections and freeway segments in the southwest portion of the study area.

The intersection and interchange MOEs presented in Table 1-2 are the primary features that provide an estimate of the traffic operations of the study area network. However, additional MOEs (segment LOS and travel times) were developed from outputs extracted from the traffic models. Segment LOS is also shown on Figures 6 through 9 and travel time information is presented in Section 1.3.3.4. Segment LOS should be considered as a secondary evaluation and consists of measured data extracted from TransModeler simulation runs and applied to Highway Capacity Manual (HCM) LOS methodologies.

1.3.3.4 Travel Time Analysis

Existing and projected future travel time information was collected from real-time and modeled travel data and compared to ideal traffic conditions to evaluate the existing and future traffic operations along two routes within the study area (see Exhibit B on next page). The ideal traffic conditions represent the speed and travel time anticipated if users were able to travel at posted speed limits unimpeded by congestion or traffic signal delays. The North Route follows US 17 from NC 130 (Whiteville Road) to Hickman Road, continues along Hickman Road/Wampee Road to SC 9, and then turns onto SC 9 before ending at SC 31, for a total distance of 18.7 miles. The South Route follows US 17 from NC 130 to SC 9, then turns onto SC 9 before ending at SC 31, for a total distance of 19.6 miles. An average speed of 55 mph was assumed for the North Route since the majority of the roadways along this route have a posted limit of 55 mph. A short segment (less than 0.5 mile) of Wampee Road is posted at 45 mph near the SC 9 intersection. An average speed of 50 mph was assumed for the South Route since the posted speed limit along US 17 is 55 mph in North Carolina and varies from 40 to 45 mph in South Carolina. As a result, average daily travel times were estimated to be approximately 20 minutes for the North Route and 23 minutes for the South Route.

As discussed further below, the existing (2018) real-time travel time data used in the travel time analysis was obtained from two sources: field studies conducted by National Data and Surveying Services (NDS), and on-line data collected by HERE Technologies (as provided by the NCDOT Traffic Systems Operations Unit). The existing and future modeled travel time data was also obtained from two sources: the GSATS MPO Travel Demand Model and TransModeler model runs.

Exhibit B. Study Area Travel Time Analysis North and South Routes

Real-Time Travel Time Data

Field travel time runs were conducted within the study area by NDS from August 21 to August 26, 2018. Four consecutive runs were completed during the midday (11 AM to 12 PM) and PM peak (4 PM to 5 PM) periods each day in both directions of each corridor. The travel time analysis results indicate that motorists are traveling 10 percent slower than the ideal traffic conditions based on the posted speed limits. The reduction in travel speed is likely due to signal delay experienced by motorists having to stop at one or more intersections along the corridor. A total of five signalized intersections are present along the North Route and fourteen signalized intersections are present along the South Route. The majority of these signals are separated by more than a mile and uncoordinated, resulting in less efficient progression through the corridor.

Exhibits C and D (see next page) show speed profiles for the North Route and South Route weekday PM peak period, in both the northbound and southbound directions, created using the NDS travel time runs data. The speed profiles indicate that while average corridor speeds are about 46 mph for both routes, speeds vary widely along both routes. The speed profiles for both routes indicate multiple times during which the vehicle was traveling less than 30 mph or stopped altogether. These delays can be attributed to traffic signals along both routes, as well as increased delays for waiting behind turning vehicles. Localized congestion is evident along the North Route at the Little River Road and SC 9 signalized intersections. The South Route shows drops in speed at the signalized intersections along the southern portion of US 17 and SC 9 between SC 31 and Charter Drive. These roadway segments have more access points to adjoining neighborhoods and commercial land uses.

HERE Technologies collects real-time GPS data from cell phone providers to determine traffic volume, vehicle speed, and vehicle delay statistics. Data collected from August 7 to 9, 2018 was provided by the NCDOT Traffic Operations Unit for segments along US 17, Hickman Road, and SC 9. Data was not available for the segment of Wampee Road from the South Carolina State Line to SC 9. A review of the data indicates that motorists generally incurred little to no delay on Hickman Road from US 17 to the South Carolina State Line, with vehicle speeds ranging from 46 to 55 mph. However, vehicle speeds along US 17 from Hickman Road to SC 90 were just below 35 mph. Along SC 9 speeds varied based on peak hour and direction of travel. Off-peak direction speeds were at or above posted limits, while peak direction speeds were 40 to 60 percent below posted limits. The lower speeds are indicative of reduced signal progression and increased turning movements.

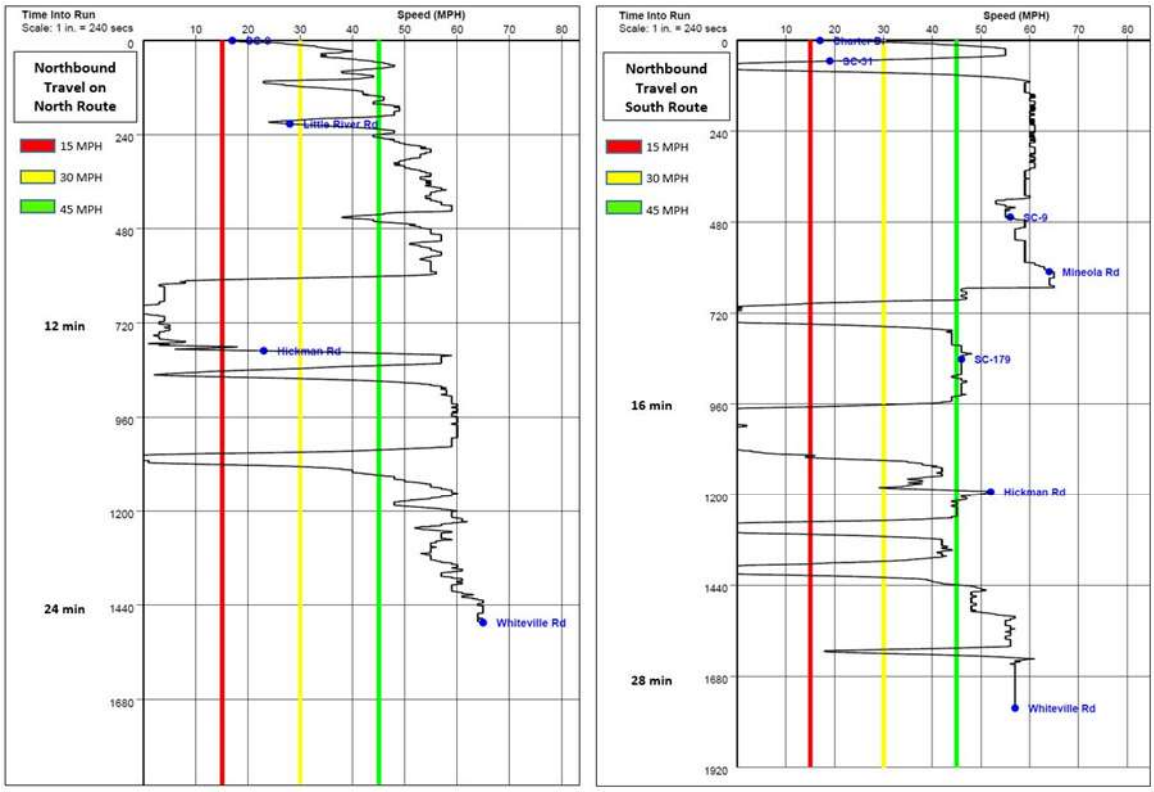

Exhibit C. Speed Profiles for NDS North Route and South Route, Weekday PM Peak, Northbound Travel Time Run

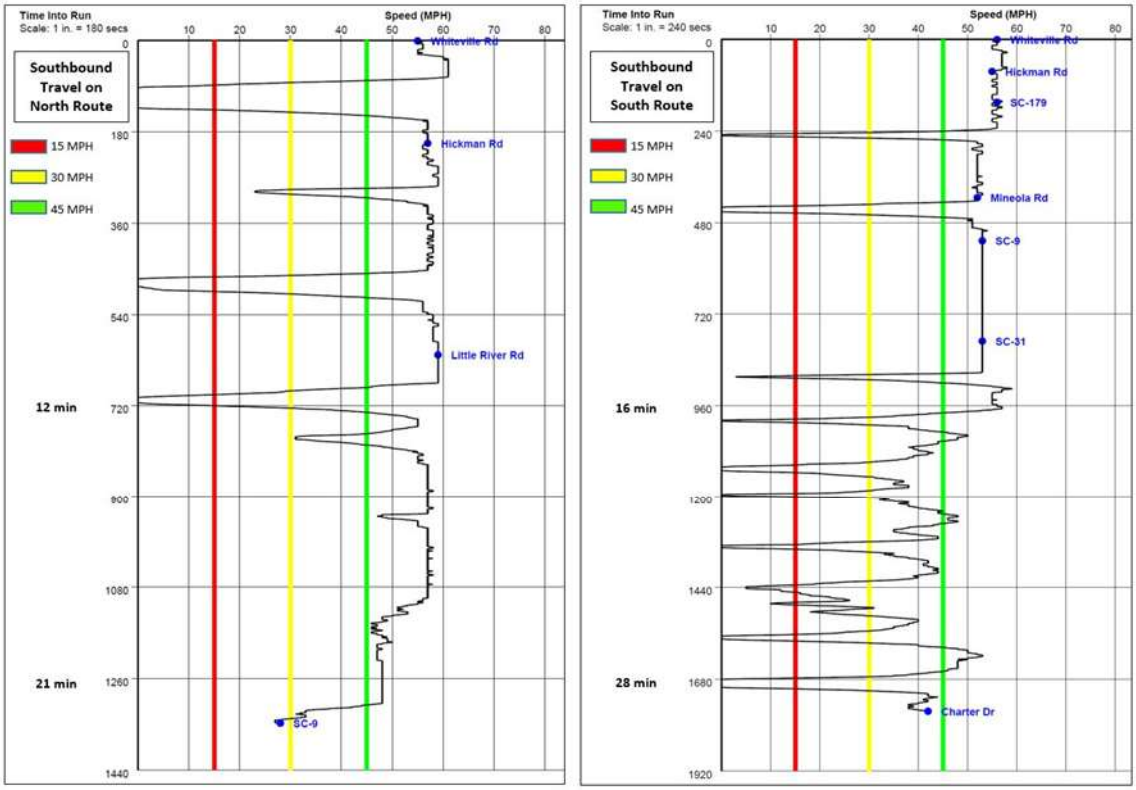

Exhibit D. Speed Profiles for NDS North Route and South Route, Weekday PM Peak, Southbound Travel Time Run

Traffic Model Data

Travel time and speed for both routes calculated from the GSATS Travel Demand Model for 2015 No-Build and 2040 No-Build are shown in Table 1-3. The model uses road classification and forecast volumes to estimate operational speeds and delay. For the 2015 non-summer weekday, the PM peak hour shows substantial delays, with travel times more than one and a half times ideal traffic conditions for the North Route. The speed results indicate that motorists are traveling from 45 to 60 percent below the posted speed limit. By 2040, the GSATS model indicates conditions will worsen substantially for all scenarios analyzed, in particular the PM peak hour.

Table 1-3. Summary of Travel Time and Speed for North and South Routes

Scenario		North Route				South Route			
		Northbound		Southbound		Northbound		Southbound	
		AM	PM	AM	PM	AM	PM	AM	PM
Ideal Traffic Conditions	Travel Time (minutes)	20				24			
	Speed (mph)	55.0				50.0			
NDS 2018 Summer Weekday	Travel Time (minutes)	22	23	22	22	29	29	32	27
	Speed (mph)	49.3	48.7	49.3	51.0	43.0	43.9	43.0	43.3
Base Year									
GSATS Model 2015 Weekday	Travel Time (minutes)	28	36	29	36	29	35	27	35
	Speed (mph)	41.5	32.1	41.7	32.0	41.7	34.3	42.9	33.1
TransModeler 2016 Weekday	Travel Time (minutes)	23	23	22	23	26	25	24	24
	Speed (mph)	47.9	49.3	50.6	49.4	45.7	47.7	48.7	48.0
TransModeler 2016 Summer Weekday	Travel Time (minutes)	25	23	22	23	27	26	24	25
	Speed (mph)	45.0	47.9	49.5	48.0	44.3	46.0	48.1	45.2
Future Year									
GSATS Model 2040 Weekday	Travel Time (minutes)	39	55	39	56	35	59	34	62
	Speed (mph)	29.7	21.0	29.4	20.4	34.6	20.3	34.4	18.9
	Increase over 2015 (Minutes and Percent)	11 (40%)	19 (53%)	10 (44%)	20 (57%)	6 (21%)	24 (69%)	7 (25%)	27 (75%)
TransModeler 2040 Weekday	Travel Time (minutes)	25	25	24	25	28	26	25	26
	Speed (mph)	45.0	44.6	46.8	44.7	42.2	44.7	45.4	43.7
	Increase over 2016 (Minutes and Percent)	2 (6%)	2 (10%)	2 (8%)	2 (10%)	2 (8%)	1 (6%)	1 (7%)	2 (10%)
TransModeler 2040 Summer Weekday	Travel Time (minutes)	27	25	26	26	29	30	26	32
	Speed (mph)	41.3	44.9	42.0	42.5	41.1	39.2	43.3	35.2
	Increase over 2016 (Minutes and Percent)	2 (9%)	2 (7%)	4 (18%)	3 (13%)	2 (8%)	4 (16%)	2 (11%)	7 (28%)

TransModeler was used to analyze 2016 forecasted traffic volumes and generate travel time and speed information for each corridor (see Table 1-3). The microscopic model uses roadway, vehicle, and traffic signal parameters to simulate flow, speed, and density. For both 2016 non-summer weekday and summer weekday conditions, the modeled travel times were generally slightly above the travel times under ideal traffic conditions, as much as five minutes (with a 10.0 mph speed reduction) for the northbound North Route in the AM peak hour under summer weekday conditions. The 2040 No-Build traffic volumes were also analyzed using TransModeler to estimate the future travel conditions in comparison to ideal traffic conditions. The 2040 modeled travel times for all scenarios analyzed ranged

between one and eight minutes more than the travel times under ideal traffic conditions. The greatest increase in the 2040 travel time in comparison to ideal traffic conditions was eight minutes (with a 14.8 mph speed reduction) for the southbound South Route in the PM peak hour under summer weekday conditions.

1.3.4 Transportation Demand

Increases in population in the Demographic Study Area (DSA) can be expected to result in increased demand on roadways. The DSA is defined to provide demographic characteristics for the community surrounding the project, and contains the smallest statistical area of US Census Block Group boundaries that contain the Direct Community Impact Area (DCIA). The DCIA is the area surrounding a transportation project that is likely to be directly affected in any way during, throughout, and after project completion. The DSA and DCIA boundaries are shown on Figure 10. According to US Census Bureau statistics, the DSA has experienced notably high rates of growth in recent years, considerably higher than countywide and statewide rates. Total population growth in the DSA between 2000 and 2010 was approximately 55.1 percent (4.5 percent annually), while countywide growth rates for the same period were approximately 46.9 percent (3.9 percent annually) in Brunswick County and approximately 37.0 percent (3.2 percent annually) in Horry County.

Between the years 2010 and 2019, the DSA experienced an additional 22.2 percent population growth (2.3 percent annually). In comparison, countywide growth rates for the same period were approximately 22.7 percent (2.3 percent annually) in Brunswick County and approximately 23.4 percent (2.4 percent annually) in Horry County.

The South Carolina Revenue and Fiscal Affairs Office (https://rfa.sc.gov/) reports the Horry County population is projected to increase from 351,029 people in 2020 to 595,234 people in 2035, an approximately 70 percent change over 15 years (3.6 percent annually). The North Carolina Office of Budget and Management (https://www.osbm.nc.gov/demog/county-projections) reports the Brunswick County population is projected to increase from 136,693 people in 2020 to 236,878 people in 2050, an approximately 73 percent change over 30 years (1.9 percent annually).

As discussed in Section 1.1.1.2, US 17 within the study area is part of South Carolina's Strategic Freight Roadway Network and North Carolina's Priority Highway Freight Network. As population grows in the project area, so will the demand for goods moved on the existing transportation networks in both States, in particular roadways such as US 17 that are part of identified priority freight networks. In addition, as discussed in Section 1.1.1.1, the project vicinity is a major destination for recreation and tourism in both states. The growth in tourism, as well as supporting services, in the area also creates increased demands on existing local roads to serve mixed-purpose (i.e., extra regional and local) traffic and the need for goods and services. The increased traffic in the project area has strained the ability of the existing roadway infrastructure to effectively serve the combined extra regional and local trips, as discussed in Section 1.3.3.3. For instance, 50 percent of the intersection movements in the project area are projected to operate at failing Level of Service (LOS) E or F in 2045 under the Average Summer Weekday Traffic (ASWT) conditions.

2.0 Description of Alternatives Considered

Alternatives considered for the proposed project include the No-Build Alternative (Section 2.1), the Transportation Systems Management Alternative (Section 2.2.1), the Travel Demand Management Alternative (Section 2.2.2), the Mass Transit Alternative (Section 2.2.3), and the build alternatives.

Nine Preliminary Corridor Concepts (Section 2.2.4) were established using geographic information systems (GIS) software from Environmental Systems Research Institute (ESRI) to develop a "best path" model for the study area. The model analyzed natural and human environment features, weighted for constraint factors, and generated best path alignments between termini for which potential corridors would generate the least overall impacts. The modeling effort was also supplemented with input from local officials and the National Environmental Policy Act (NEPA)/Section 404 Merger Team. After the model was run for all routes, centerlines were developed to reflect best path alignments using the modeled corridor, roadway design criteria and constructability considerations, aerial photography, field evaluations to verify certain features, and environmental features mapping. The centerlines were buffered and the nine Preliminary Corridor Concepts were generated using 1,000-foot-wide corridors.

The Preliminary Corridor Concepts that met the purpose of and need for the proposed project and with the least impacts to the human and natural environments were identified, and seven Detailed Study Alternatives were selected by the Merger Team at the May 4, 2020, Concurrence Point 2 (Detailed Study Alternatives Carried Forward) meeting for detailed evaluation in this DEIS (Section 2.3). The Detailed Study Alternatives selection process incorporated recommendations made by Federal and state environmental regulatory and resource agencies and local municipal stakeholders, as well as comments received from two open house public meetings held in December 2019. The Detailed Study Alternatives were further refined as more comprehensive information was obtained through detailed field studies and environmental analysis.

Each of the seven Detailed Study Alternatives include two Construction Phase 1 scenarios (CP1 – S1 and CP1 – S2) that were developed in 2024 to address funding constraints for the North Carolina portion of the Carolina Bays Parkway Extension. The two Construction Phase 1 scenarios are described in Section 2.5.

2.1 No-Build Alternative

The No-Build Alternative would not provide any substantial improvements to roadways within the study area through the year 2045. Only typical maintenance activities such as patching, resurfacing, regrading shoulders, and maintaining ditches would occur. The No-Build Alternative would not incur right-of-way or construction costs. There would be no impacts to streams, wetlands, or other natural or cultural resources, nor any residential or business relocations. The No-Build Alternative would not enhance mobility or connectivity for traffic moving in and through the study area. Without improvements to the transportation network the primary purpose of the proposed project would not be met.

As discussed in Section 1.3.3, traffic capacity analyses indicate that by 2045, many intersections and roadway segments within the study area would either approach or exceed the roadway capacity limits during at least one peak hour of the day. The No-Build Alternative would not add new lanes or provide alternative routes or means of travel to existing roadways. Therefore, the traffic carrying capacity of US 17 and S-57 (Wampee Road)/Hickman Road would not improve and an increase in congestion and/or delays along these roadways could be expected. Therefore, the No-Build Alternative does not meet the

purpose of and need for the proposed project but has been retained for the purposes of the traffic operations analyses in this DEIS (Section 2.8) to provide a baseline for comparison of the Detailed Study Alternatives.

2.2 Preliminary Study Alternatives

2.2.1 Transportation Systems Management (TSM) Alternative

Transportation Systems Management (TSM) improvements involve increasing the available capacity of a roadway within the existing right-of-way with minimum capital expenditures and without reconstructing or adding additional through lanes to the existing road. There are two types of TSM roadway improvements: operational and physical improvements. Physical improvements are usually more capital intensive while operational changes are largely administrative in nature.

Examples of TSM operational improvements include traffic law enforcement, speed restrictions, access control, turn prohibitions, signal coordination, and signal phasing or timing changes. These types of improvements are appropriate to address capacity or safety deficiencies at specific locations along US 17 and other existing roadways in the project area, and would improve traffic flow along the sections of existing roadway on which they are implemented. However, US 17 and other existing roadways in the study area would not show an appreciable increase in capacity in design year 2045 with operational improvements.

Physical TSM improvements are also appropriate to address site-specific capacity and safety issues. Physical TSM improvements include the addition of turn lanes, intersection realignment, striping, signing, signalization, and minor roadway realignments. Recently completed SCDOT STIP Project P038944, which involved physical and safety improvements to the Wampee Road (S-57)/Little River Road (S-111) intersection, is an example of a physical TSM improvement project. Construction on the project was completed in late 2022 and included installation of a traffic signal and left-turn lanes on all four intersection approaches. It is expected that this project will improve traffic operations in the vicinity of this intersection; however, it is expected that Wampee Road would not show an appreciable increase in capacity in the design year with these improvements.

NCDOT recently completed two physical TSM improvement projects along the US 17 corridor in the study area. NCDOT STIP Projects W-5601GA (US 17/Thomasboro Road/Pea Landing Road intersection) and W-5703H (US 17/Hickman Road intersection) converted these intersections to Synchronized Street configurations. In addition, NCDOT is planning to convert the US 17/NC 904 intersection (STIP Project R-5851), as well as the two US 17/US 17 Business (Main Street) intersections (both south and north of Shallotte) (STIP Project R-5857) to Synchronized Street configurations. (See Table 3-6 for additional information on these projects, including the NCDOT STIP schedules.) These improvements are expected to help alleviate congestion and improve safety on US 17 at these intersections. Although the future no-build traffic projections and traffic capacity analyses performed for the subject project assumed the R-5851 and R-5857 projects were constructed, the results of the traffic capacity analyses indicated that many existing intersections and roadway segments in the project area would continue to either approach or exceed the roadway capacity limits in 2045. TSM physical improvements would not provide a full control of access facility that would be able to improve regional mobility and connectivity, allow for high-speed travel, limit access to major crossroads by way of interchanges, and provide an appreciable increase in traffic capacity (i.e., additional through traffic lanes) on the study area's roadway network.

In summary, TSM improvements would not add new lanes, control access, or provide alternative routes or means of travel to existing roadways. Mobility and connectivity would not improve for traffic moving in and through the study area, particularly in the South Carolina portion of the study area. The TSM Alternative does not meet the purpose of and need for the proposed project and has been eliminated from further consideration.

2.2.2 Travel Demand Management (TDM) Alternative

Travel Demand Management (TDM) is an approach to mitigating traffic congestion. Examples of TDM alternatives include ridesharing, park & ride, flexible work schedules, and telecommuting programs. Ridesharing provides a vehicle option for people who normally travel via public transportation and non-motorized modes, but at times need to make special trips (e.g., grocery shopping, trips to rural areas, trips from a transit station to a final destination). Employers who provide flexible work schedules allow employees to choose their arrival and departure times, which may reduce peak travel demand by allowing employees to avoid the most congested travel times or more easily coordinate carpools and vanpools. Telecommuting allows employees to work from home. Because telecommuters are not traveling between home and work, travel demand may be reduced, particularly during peak hours.

The TDM Alternative is not a reasonable alternative for the proposed project by nature of the study area, a tourist destination and home to communities serving a large retiree population. It would not improve the transportation network within the study area by enhancing mobility or connectivity for traffic moving in and through the study area. The TDM Alternative does not meet the purpose of and need for the proposed project and has been eliminated from further consideration.

2.2.3 Mass Transit Alternative

The Mass Transit Alternative considers forms of transportation other than the single-occupancy passenger vehicle such as bus services, rail services, and express lanes. Express lanes are optional tolled lanes that are generally constructed along existing roadway facilities, typically interstates and other controlled access facilities, in heavily congested roadway corridors. Express lanes, such as High Occupancy Vehicle (HOV) or High Occupancy Transit (HOT) lanes and busways, provide a choice for drivers to bypass congestion when desired. Express lanes are intended to provide a mobility choice and more reliable travel times in peak periods for motorists and bus patrons. Alternatives for constructing express lanes on existing roadway facilities involve either converting existing lanes to express lanes or adding additional lanes to the roadway. Current roadway access and land use along area roads is not conducive to adding express lanes or converting existing lanes to express lanes.

The study area is not currently served by passenger or freight rail service, and there are no existing railroad facilities in the vicinity of the project study area.

Coast RTA provides regional public transportation services in Horry and Georgetown Counties in South Carolina, including 10 regularly scheduled fixed bus routes, paratransit services, and emergency management assistance. Currently, none of the Coast RTA fixed routes operate within the study area. The Brunswick Transit System (BTS) provides non-emergency transportation services to the general public of Brunswick County and, through contract, to human service agency clients in Brunswick County. BTS does not offer fixed route service.

The Mass Transit Alternative would only minimally address the current traffic flow problems in the area. In addition, it would not be a reasonable alternative because of potential lack of demand, dispersed

residential areas and employment centers, and diversity of trip origins and destinations. The Mass Transit Alternative does not meet the purpose of and need for the proposed project and has been eliminated from further consideration.

Tolling

As discussed previously, the proposed Carolina Bays Parkway Extension project is currently funded for right-of-way (2026) and construction (2028) in the SCDOT 2024-2033 STIP (Project P029554). Tolling was not considered as a financing option for the portion of the project in South Carolina. The proposed project is not currently funded for right-of-way or construction in the NCDOT 2024-2033 STIP (Project R-5876). For the currently unfunded North Carolina section of the proposed project, the use of toll roads could be considered under certain conditions for major new roadway construction projects. The NC Toll Project Development Policy (adopted by the NC Board of Transportation in February 2018) defined and implemented NCDOT's process for evaluating the feasibility of using toll financing for appropriate high-capacity urban and rural highway improvement projects, such as the proposed Carolina Bays Parkway Extension. The Policy also indicates that the feasibility of using toll financing will be determined in cooperation with North Carolina's MPOs and Rural Transportation Planning Organizations (RPOs). For any toll project to be programmed and constructed by NCDOT, it must first be approved by the nominating MPO or RPO through inclusion in their adopted Comprehensive Transportation Plan, Metropolitan Transportation Plan, or other adopted local plan. The project must also advance through the state's Strategic Prioritization process and score well enough to be included in the local Transportation Improvement Program and the Statewide Transportation Improvement Program. The proposed Carolina Bays Parkway Extension is not included in any adopted local plans for consideration as a toll facility, as a result the financial feasibility of tolling the proposed project has not been evaluated.

2.2.4 Preliminary Corridor Concepts

The nine Preliminary Corridor Concepts (Corridor Concept 1 through Corridor Concept 9) for the Carolina Bays Parkway Extension (developed as discussed in Section 2.0) were presented to the NEPA/ Section 404 Merger Team during meetings held in September 2019 and May 2020. The nine Preliminary Corridor Concepts were also presented to the general public at two open house public meetings held in December 2019. Based on comments received from the Town of Sunset Beach at the public meetings, two additional Preliminary Corridor Concepts were added (Concepts 1A and 4A), for a total of eleven Preliminary Corridor Concepts initially developed for the proposed project and evaluated by the Merger Team. Table G-1 in Appendix G identifies nearby resources and potential environmental effects for the eleven Preliminary Corridor Concepts.

The eleven Preliminary Corridor Concepts are described below and shown on Figure 11. It should be noted that the northern alignment section of Preliminary Corridor Concepts 1 and 4 from Hickman Road to US 17 in North Carolina was developed outside of the modeling process described in Section 2.0 in response to input received from a local jurisdiction following the first local officials meeting.

The Merger Team's decision on whether to retain each Preliminary Corridor Concept as a Detailed Study Alternative for detailed evaluation in this DEIS is also discussed below. A comparison of the potential environmental effects of the eleven Preliminary Corridor Concepts was prepared and presented to the Merger Team to assist in the decision-making process. As discussed in Section 2.0, the nine Preliminary Corridor Concepts were initially generated using 1,000-foot-wide corridors to find a best path (i.e., least overall impacts) alignment for the Corridor Concepts. However, to compare the relative impacts of the

Preliminary Corridor Concepts prior to developing detailed functional roadway designs, 400-foot-wide corridors, generally 200 feet on each side of the corridor concept centerline, were developed and used to calculate the potential impacts. The 400-foot-wide corridors are more reflective of the anticipated impacts of the proposed project, although as discussed in Section 2.7.3, the actual proposed right-of-way width is generally 300 feet. The notable potential impacts for each Preliminary Corridor Concept based on the 400-foot impact boundary and GIS data as discussed in Section 2.0 are also summarized below. The Detailed Study Alternatives are discussed in Section 2.3, and a comparison of the anticipated impacts for the Detailed Study Alternatives based on the preliminary designs and data based on field observations and delineations is provided in Table S-1 in the Summary section of this DEIS.

Preliminary Corridor Concept 1

Corridor Concept 1 extends to the east from the SC 9 interchange before turning north to cross Wampee Road (S-57) near its intersection with Little River Road (S-111). The new location alignment runs generally north of and parallel to Wampee Road for approximately 2.3 miles to the North Carolina State Line. In North Carolina, Corridor Concept 1 continues east on new location and turns north to parallel Ash Little River Road for approximately 2.2 miles, crossing this facility at three locations before again turning east. The new location route runs southeast for approximately 5.2 miles, crossing Gwynn Road and Pea Landing Road before tying into existing US 17 at NC 904.

Corridor Concept 1 was presented to the Merger Team at the September 30, 2019, Alternatives Screening Meeting. Input from the team at that meeting resulted in a revision to the Corridor Concept 1 alignment in the vicinity of NC 904. The revision reduced impacts to several natural and human environment features, including wetlands and single-family residences. The revised Corridor Concept 1 alignment was shown at the December 2019 public meetings.

Based on public input, Corridor Concept 1 is the highest ranked alternative in terms of preference of the nine Preliminary Corridor Concepts presented at the December 2019 public meetings, and is endorsed by the Towns of Shallotte and Carolina Shores. When compared to the other Preliminary Corridor Concepts, Corridor Concept 1 has among the lowest impacts to wetlands, ponds, 100-year floodplain, residential and commercial structures, cemeteries, and golf courses. Following the December 2019 public meetings, the Merger Team recommended carrying forward Corridor Concept 1 for detailed study, and it has been selected as one of the seven Detailed Study Alternatives for evaluation in this DEIS.

Preliminary Corridor Concept 1A

Corridor Concept 1A follows the same alignment as Corridor Concept 1 from the SC 9 interchange to Pea Landing Road. From here, Corridor Concept 1A turns to the east and crosses NC 904 near the Russtown Road intersection. The route then continues on new location to the east, generally north of and parallel to Old Shallotte Road. Corridor Concept 1A then crosses McMilly Road before turning slightly to the northeast and tying into the existing US 17 Shallotte Bypass just west of NC 130.

Corridor Concept 1A was developed after the December 2019 public meetings based on public comments, as well as an alternative corridor concept submitted by the Town of Sunset Beach. The Town's corridor concept extended Corridor Concept 1 inland and parallel to US 17 from Pea Landing Road to US 17 north of Shallotte. The Town of Calabash also supported developing a similar alternative to the concept submitted by the Town of Sunset Beach. In response to the public feedback on the Preliminary Corridor Concepts, three options to extend Corridor Concept 1 inland and parallel to US 17 were evaluated. These options included:

- A similar option to the Town of Sunset Beach's suggested concept, but instead of continuing the corridor beyond NC 130 to US 17 north of Shallotte as recommended by the Town, which would add several miles to the project and essentially create a bypass of the US 17 Shallotte Bypass, the studied option terminated at an interchange with NC 130. While this option reduced overall impacts, it was not selected because of potential traffic and access conflicts at South Brunswick High School.
- An option that generally followed Old Shallotte Road from NC 904 to US 17. While this option reduced impacts in several categories, it was not selected because it resulted in substantial impacts to High Quality Waters and single-family residential structures and would create access issues for some farms.
- A new location option, known as Option A, from NC 904 to the US 17 Shallotte Bypass developed using GIS modeling methodology. Option A would cross NC 904 near the Russtown Road intersection and then continue on new location to the east, generally north of and parallel to Old Shallotte Road. It then crosses McMilly Road before turning slightly to the northeast and tying into the existing US 17 Shallotte Bypass just west of NC 130. Option A reduces impacts to most human and natural environment categories over Corridor Concept 1 and was added to the Preliminary Corridor Concepts as Corridor Concept 1A.

Corridor Concept 1A further reduces impacts to several environmental features in comparison to Corridor Concept 1, including streams, High Quality Waters, 100-year floodplain, floodway, commercial structures, cemeteries, and golf courses. Although Corridor Concept 1A was not shown at the December 2019 public meetings, it was recommended by the Merger Team for further study, and it has been selected as one of the seven Detailed Study Alternatives for evaluation in this DEIS.

Preliminary Corridor Concept 2

Corridor Concept 2 follows the same alignment as Corridor Concept 1 from the SC 9 interchange to the North Carolina State Line. In North Carolina, the new location alignment includes a new interchange with Ash Little River Road and travels another 1.3 miles on new location before tying into Hickman Road near its intersection with Shingletree Road. Corridor Concept 2 follows Hickman Road and US 17 along existing location for the remainder of its length (approximately 11.9 miles).

Corridor Concept 2 was presented to the Merger Team at the September 30, 2019, Alternatives Screening Meeting and shown at the December 2019 public meetings.

Based on public input, Corridor Concept 2 ranks sixth in terms of preference out of the nine Preliminary Corridor Concepts presented at the December 2019 public meetings, and is endorsed by the Town of Shallotte. In comparison to the other Preliminary Corridor Concepts, Corridor Concept 2 would result in lower impacts to wetlands, moderate impacts to streams, and higher impacts to 100-year floodplain. With the exception of churches, Corridor Concept 2 would have low to moderate impacts to the human environment.

Following the December 2019 public meetings, the Merger Team recommended carrying forward Corridor Concept 2 for detailed study, and it has been selected as one of the seven Detailed Study Alternatives for evaluation in this DEIS.

Preliminary Corridor Concept 3

Corridor Concept 3 would use the same alignment as Corridor Concepts 1 and 2 through South Carolina. As it crosses the North Carolina State Line, the new location alignment immediately ties into Hickman

Road and follows both this route and US 17 on existing location for the remainder of its length (approximately 14.0 miles).

Corridor Concept 3 was presented to the Merger Team at the September 30, 2019, Alternatives Screening Meeting and shown at the December 2019 public meetings.

In comparison to other corridors, Corridor Concept 3 would result in lower wetland impacts, moderate stream impacts, and moderate to high impacts on the human environment. Based on public input, Corridor Concept 3 ranks seventh in terms of preference out of the nine Preliminary Corridor Concepts presented at the December 2019 public meetings. There is little variation in the alignment between Corridor Concept 3 and Corridor Concept 2. Corridor Concepts 2 and 3 present similar wetland and stream impacts; however, Corridor Concept 3 would have greater impacts to the human environment because it follows the section of Hickman Road between the South Carolina State Line and just east of Shingletree Road. As a result, Corridor Concept 3 would impact the existing and proposed residential subdivisions along this section of Hickman Road, as well as the Indigo Farms Market, whereas Corridor Concept 2 passes through undeveloped areas to the north of this section of Hickman Road, before turning south to follow Hickman Road to the east of Shingletree Road. In comparison to Corridor Concept 2, Corridor Concept 3 would impact 46 additional residences, four additional businesses, two additional churches, three additional cemeteries, and two additional golf courses, as well as over 13 additional acres of approved residential development.

Following the December 2019 public meetings, the Merger Team recommended eliminating Corridor Concept 3 from further study due to other significant adverse environmental consequences (i.e., high impacts to the human environment), as discussed above. As a result, Corridor Concept 3 has been eliminated from further study in this DEIS.

Preliminary Corridor Concept 4

In comparison to Corridor Concepts 1, 2, and 3, Corridor Concept 4 would follow a more southerly new location alignment from the SC 9 interchange before intersecting Little River Road at a proposed interchange. The route would then curve back to the north and provide a new interchange at Hickman Road, just east of the North Carolina State Line. From here, Corridor Concept 4 would follow the same alignment as Corridor Concept 1 through the remainder of North Carolina.

Corridor Concept 4 was presented to the Merger Team at the September 30, 2019, Alternatives Screening Meeting. Input from the team at that meeting resulted in a revision to the Corridor Concept 4 alignment in the vicinity of NC 904. The revision reduced impacts to several human and natural environment features, including wetlands and single-family residences. The revised Corridor Concept 4 alignment was shown at the December 2019 public meetings.

Based on public input, Corridor Concept 4 is the second highest ranked alternative in terms of preference of the nine Preliminary Corridor Concepts presented at the December 2019 public meetings, and is endorsed by the Town of Carolina Shores. When compared to the other Preliminary Corridor Concepts, Corridor Concept 4 has higher impact to wetlands and streams, though lower impact to 100-year floodplain. With the exception of cemeteries, human environment impacts are lower than most of the Preliminary Corridor Concepts.

Following the December 2019 public meetings, the Merger Team recommended carrying forward Corridor Concept 4 for detailed study, and it has been selected as one of the seven Detailed Study Alternatives for evaluation in this DEIS.

Preliminary Corridor Concept 4A

As with Corridor Concept 1A, Corridor Concept 4A was also developed after the December 2019 public meetings based on public comments, as well as the alternative corridor concept submitted by the Town of Sunset Beach. Corridor Concept 4A was developed by incorporating Option A (discussed above as part of Corridor Concept 1A) into Corridor Concept 4. It follows the same route as Corridor Concept 4 from the SC 9 interchange through Pea Landing Road. Corridor Concept 4A then follows the same route as Corridor Concept 1A to the existing US 17 Shallotte Bypass just west of NC 130.

While wetland impacts remain higher when compared to the other Preliminary Corridor Concepts, Corridor Concept 4A results in decreased impacts in several other categories including streams, High Quality Waters, 100-year floodplain, floodway, commercial structures, cemeteries, and golf courses. Corridor Concepts 4 and 4A would provide an alternate option to the alignment followed by Corridor Concept 1 in South Carolina.

Although Corridor Concept 4A was not shown at the December 2019 public meetings, it was recommended by the Merger Team for further study, and it has been selected as one of the seven Detailed Study Alternatives for evaluation in this DEIS.

Preliminary Corridor Concept 5

Corridor Concept 5 follows the same alignment as Corridor Concept 4 from the SC 9 interchange to the North Carolina State Line. Corridor Concept 5 also includes a new interchange at Hickman Road before turning east to cross Ash Little River Road and continuing approximately 1.3 mile on new location before tying into existing Hickman Road in the same location as Corridor Concept 2. From here it would use existing location Hickman Road and US 17 for the remainder of its length (approximately 11.9 miles).

Corridor Concept 5 was presented to the Merger Team at the September 30, 2019, Alternatives Screening Meeting and shown at the December 2019 public meetings.

When compared to the other Preliminary Corridor Concepts, Corridor Concept 5 would result in higher wetland, church and cemetery impacts. Impacts to other human and natural environment features would be generally moderate; however, impacts to single family residential structures would be low. Based on public input, Corridor Concept 5 ranks eighth in terms of preference out of the nine Preliminary Corridor Concepts presented at the December 2019 public meetings.

Following the December 2019 public meetings, the Merger Team recommended eliminating Corridor Concept 5 from further study due to higher adverse impacts to the aquatic ecosystem (i.e., wetlands) in comparison to the other Preliminary Corridor Concepts, as discussed above. As a result, Corridor Concept 5 has been eliminated from further study in this DEIS.

Preliminary Corridor Concept 6

Corridor Concept 6 follows the same new location alignment as Corridor Concepts 4 and 5 through South Carolina. In North Carolina, the proposed alignment would tie immediately to Hickman Road in the same location as Corridor Concept 3 and follow existing location Hickman Road and US 17 for approximately 14.0 miles.

Corridor Concept 6 was presented to the Merger Team at the September 30, 2019, Alternatives Screening Meeting and shown at the December 2019 public meetings.

When compared to the other Preliminary Corridor Concepts, Corridor Concept 6 would result in higher impacts to wetlands, streams, churches, cemeteries, and golf courses, and moderate impacts in most other categories. Corridor Concept 6 is endorsed by the Town of Calabash; however, it is the least preferred in terms of preference of the nine Preliminary Corridor Concepts presented at the December 2019 public meetings based on public input.

Following the December 2019 public meetings, the Merger Team recommended eliminating Corridor Concept 6 from further study due to higher adverse impacts to the aquatic ecosystem (i.e., wetlands and streams) in comparison to the other Preliminary Corridor Concepts, as discussed above. As a result, Corridor Concept 6 has been eliminated from further study in this DEIS.

Preliminary Corridor Concept 7

Corridor Concept 7 uses the same alignment as Corridor Concepts 4, 5, and 6 from the SC 9 interchange to the proposed Little River Road interchange. Corridor Concept 7 continues to the northeast on new location, but follows a more southerly route into North Carolina than Corridor Concepts 1 through 6. Corridor Concept 7 is the only option to cross McLamb Road in North Carolina and includes a proposed interchange at Calabash Road. The alignment would then continue northeast, crossing Shingletree Road and tying into existing US 17 near its intersection with Hickman Road. Corridor Concept 7 would use existing location US 17 for the remainder of its length (approximately 10.2 miles).

Corridor Concept 7 was presented to the Merger Team at the September 30, 2019, Alternatives Screening Meeting and shown at the December 2019 public meetings.

Based on public input, Corridor Concept 7 ranks fifth in terms of preference out of the nine Preliminary Corridor Concepts presented at the December 2019 public meetings. When compared to the other Preliminary Corridor Concepts, Corridor Concept 7 would have moderate impacts to single family residential structures and lower impacts to churches and commercial/industrial structures, but higher impacts to apartments/condominiums, approved/planned residential developments, and golf courses. Corridor Concept 7 would have lower stream impacts and higher impacts to wetlands.

Following the December 2019 public meetings, the Merger Team recommended carrying forward Corridor Concept 7 for detailed study, and it has been selected as one of the seven Detailed Study Alternatives for evaluation in this DEIS.

Preliminary Corridor Concept 8

Corridor Concept 8 follows the southernmost alignment from the SC 9 interchange, running on new location to the northeast with proposed interchanges at Little River Road and Mineola Avenue in South Carolina. The alignment curves to the northeast at Mineola Avenue, traversing on new location across the North Carolina State Line and tying into existing US 17 just north of its intersection with Calabash Road. Corridor Concept 8 uses existing US 17 for the remainder of its length, or approximately 12.6 miles.

Corridor Concept 8 was presented to the Merger Team at the September 30, 2019, Alternatives Screening Meeting and shown at the December 2019 public meetings.

When compared to the other Preliminary Corridor Concepts, Corridor Concept 8 would result in high impacts to streams and single- and multi-family residential structures, and moderate impacts in most other categories. Corridor Concept 8 would also impact approximately 3.4 acres of Essential Fish Habitat

(EFH). Based on public input, Corridor Concept 8 ranks fourth in terms of preference out of the nine Preliminary Corridor Concepts presented at the December 2019 public meetings.

During the May 2020 Concurrence Point 2 (CP 2) meeting, NCDOT and SCDOT initially recommended eliminating Corridor Concept 8 from detailed study. The US Army Corps of Engineers, National Marine Fisheries Service, US Fish and Wildlife Service, and NC Division of Water Resources supported the initial recommendation to eliminate Corridor Concept 8 from detailed study. In subsequent discussion, NCDOT Community Studies suggested Corridor Concept 8, or a variation, may provide potential opportunity to reduce impacts to the human environment as well as provide a more southerly route to consider in the range of alternatives. As such, NCDOT requested to add this option to the concepts that will be carried forward for detailed study. Based on NCDOT's request, the Merger Team recommended carrying forward Corridor Concept 8 for detailed study, and it has been selected as one of the seven Detailed Study Alternatives for evaluation in this DEIS.

Preliminary Corridor Concept 9

Like Corridor Concept 8, Corridor Concept 9 follows the southernmost alignment from the SC 9 interchange, running to the northeast to cross Little River Road and Mineola Avenue, with proposed interchanges at both of these routes. To the east of Mineola Avenue, the alignment curves to the southeast to tie in with existing US 17 just south of the North Carolina State Line. From here, Corridor Concept 9 follows US 17 for the remainder of its length (approximately 14.2 miles) through South Carolina and North Carolina to the project terminus.

Corridor Concept 9 was presented to the Merger Team at the September 30, 2019, Alternatives Screening Meeting and shown at the December 2019 public meetings.

Corridor Concept 9 would result in the highest impacts to several resources, including streams, ponds, 100-year floodplain, single- and multi-family residential and commercial/industrial structures, and public parks. Corridor Concept 9 would also impact approximately 39 acres of EFH. Based on public input, Corridor Concept 9 ranks third in terms of preference out of the nine Preliminary Corridor Concepts presented at the December 2019 public meetings.

Following the December 2019 public meetings, the Merger Team recommended eliminating Corridor Concept 9 from further study due to higher adverse impacts to the aquatic ecosystem (i.e., streams and ponds) in comparison to the other Preliminary Corridor Concepts, as discussed above. It was also recommended to be eliminated due to other significant adverse environmental consequences (i.e., high impacts to the human environment), as discussed above. As a result, Corridor Concept 9 has been eliminated from further study in this DEIS.

2.3 Detailed Study Alternatives

As discussed in Section 2.2.4, following the December 2019 public meetings, the Merger Team met on May 4, 2020, to further discuss the preliminary corridor concepts. At that meeting, the Merger Team retained seven alternatives for detailed study for the proposed Carolina Bays Parkway Extension. The seven Detailed Study Alternatives (see Exhibit A) are shown on Figures 12A through 12H. A copy of the signed CP 2 concurrence form is included in Appendix B. This section provides a detailed description of the seven Detailed Study Alternatives. As discussed in Section 2.8, all of the Detailed Study Alternatives would meet the purpose of and need for the proposed project. A comparison of the anticipated impacts

for the Detailed Study Alternatives based on the preliminary designs is provided in Table S-1 in the Summary section of this DEIS.

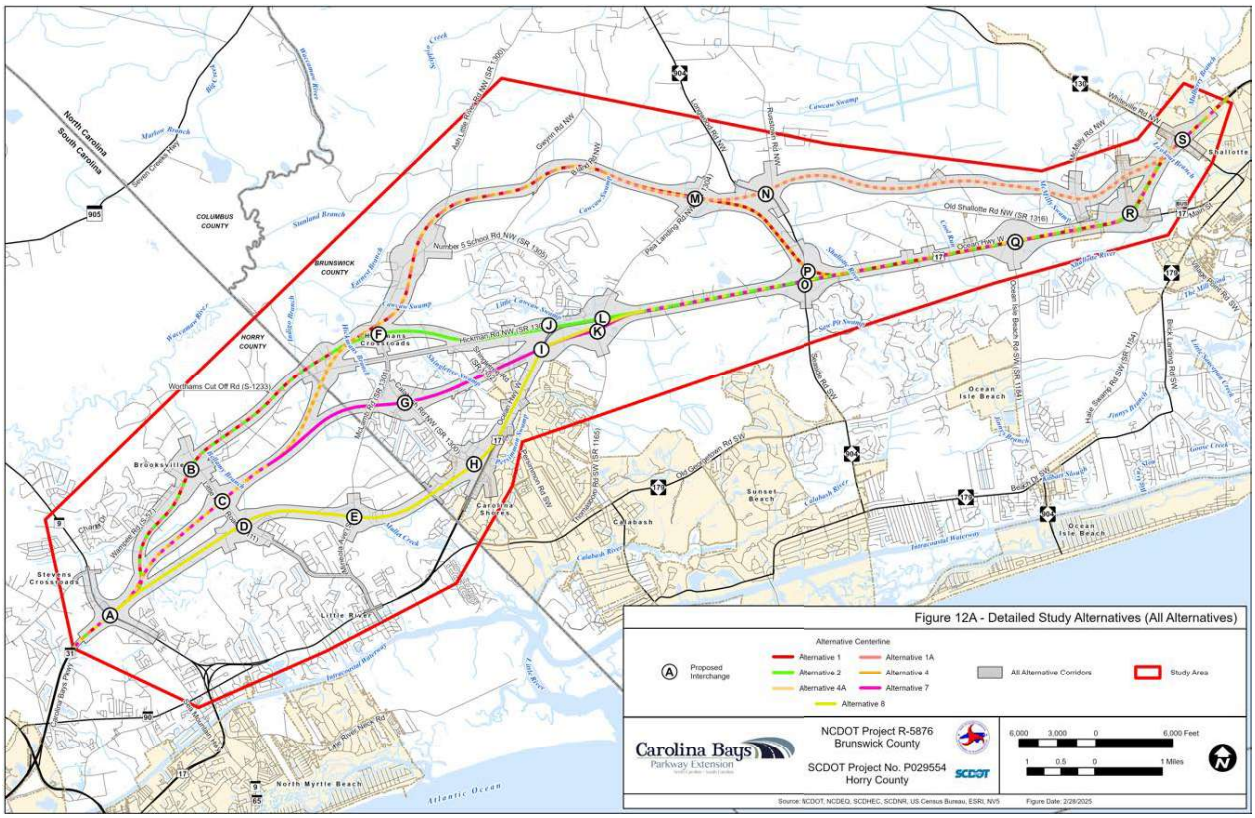

Exhibit A. Detailed Study Alternatives

Alternative 1

Alternative 1 begins in Horry County, South Carolina in the same location as all of the Detailed Study Alternatives at the existing Carolina Bays Parkway (SC 31)/SC 9 interchange. The alternative extends to the east before turning to the north for a short distance, and then back to the east to intersect Wampee Road near its intersection with Little River Road at a proposed interchange. Alternative 1 then continues generally north of and parallel to Wampee Road to the North Carolina State Line. In Brunswick County, North Carolina, Alternative 1 continues to the east to a proposed interchange with Ash Little River Road (located approximately 2,000 feet north of Hickman Road). The alternative then turns to the northeast to parallel Ash Little River Road, crossing this facility at two additional locations.

Alternative 1 then turns to the east, crossing Gwynn Road and Bland Road, before intersecting Pea Landing Road at a proposed interchange near Red Bird Lane. The alternative then turns to the southeast to tie into existing US 17 near the NC 904 intersection at a proposed interchange. Alternative 1 continues along existing US 17 to the east through a proposed interchange at Ocean Isle Beach Road, then turns to the northeast along existing US 17 Shallotte Bypass through a proposed interchange at US 17 Business/Old Shallotte Road. Alternative 1 ends just east of the existing US 17 Shallotte Bypass/ NC 130 interchange in the same location as all of the Detailed Study Alternatives.

Alternative 1A

Alternative 1A follows the same alignment as Alternative 1 from the existing Carolina Bays Parkway (SC 31)/SC 9 interchange to just west of Pea Landing Road, including the same proposed interchanges at Wampee Road/Little River Road and Ash Little River Road. Alternative 1A crosses Pea Landing Road and continues to the east to intersect NC 904 at a proposed interchange near Russtown Road. The alternative then continues to the east on new location, generally north of and parallel to Old Shallotte Road. Alternative 1A then crosses McMilly Road before turning slightly to the northeast, crossing Wildwood Street, and tying into the existing US 17 Shallotte Bypass at the existing NC 130 interchange. The alternative ends just east of the NC 130 interchange in the same location as all of the Detailed Study Alternatives.

Alternative 2

Alternative 2 follows the same alignment as Alternatives 1 and 1A from the existing Carolina Bays Parkway (SC 31)/SC 9 interchange to just west of Ash Little River Road, including the same proposed interchange at Wampee Road/Little River Road. From just west of Ash Little River Road, Alternative 2 starts to turn slightly to the southeast, so the alternative's proposed interchange at Ash Little River Road is located slightly to the south of the interchange for Alternatives 1 and 1A. Alternative 2 continues to the east and ties into Hickman Road near Crow Creek Drive. The alternative then follows Hickman Road for a short distance and ties into existing US 17 at a proposed interchange.

Alternative 2 continues to the east along existing US 17 through proposed interchanges in three locations: Pea Landing Road/Thomasboro Road; NC 904; and Ocean Isle Beach Road. The alternative then turns to the northeast along existing US 17 Shallotte Bypass through a proposed interchange at US 17 Business/Old Shallotte Road. Alternative 2 ends just east of the existing US 17 Shallotte Bypass/ NC 130 interchange in the same location as all of the Detailed Study Alternatives.

Alternative 4 (SCDOT/NCDOT Preferred)

Alternative 4 begins in Horry County, South Carolina in the same location as all of the Detailed Study Alternatives at the existing Carolina Bays Parkway (SC 31)/SC 9 interchange. The alternative extends to the east to a proposed interchange at Little River Road approximately 3,000 feet south of Wampee Road. Alternative 4 then turns to the northeast, crosses the North Carolina State Line and Hickman Road, and intersects Ash Little River Road at a proposed interchange in the same location as the interchange for Alternatives 1 and 1A (approximately 2,000 feet north of Hickman Road). Alternative 4 then follows the same alignment as Alternative 1 for the remainder of its alignment, including the same proposed interchanges at Pea Landing Road, existing US 17 near NC 904, Ocean Isle Beach Road, and US 17 Business/Old Shallotte Road. The alternative ends just east of the existing US 17 Shallotte Bypass/ NC 130 interchange in the same location as all of the Detailed Study Alternatives.

Alternative 4A

Alternative 4A follows the same alignment as Alternative 4 from the existing Carolina Bays Parkway (SC 31)/SC 9 interchange to just west of Pea Landing Road, including the same proposed interchanges at Little River Road and Ash Little River Road. From just west of Pea Landing Road, the alternative follows the same alignment as Alternative 1A for the remainder of its alignment, including the same proposed interchanges at NC 904 and US 17 Shallotte Bypass at the existing NC 130 interchange. The alternative ends just east of the existing US 17 Shallotte Bypass/NC 130 interchange in the same location as all of the Detailed Study Alternatives.

Alternative 7

Alternative 7 follows the same alignment as Alternatives 4 and 4A from the existing Carolina Bays Parkway (SC 31)/SC 9 interchange to the proposed Little River Road interchange. From here, the alternative continues to the northeast across the North Carolina State Line, but follows a more southerly route than Alternatives 4 and 4A. Alternative 7 crosses McLamb Road and then intersects Calabash Road at a proposed interchange near Meadowlands Trail. The alternative continues east across Shingletree Road, and then intersects existing US 17 at a proposed interchange approximately 1,500 feet south of the Hickman Road intersection.

Alternative 7 continues parallel to and just south of existing US 17 to a proposed interchange at Thomasboro Road (approximately 700 feet south of US 17). From here, the alternative ties into existing US 17 a short distance to the east and continues along the existing alignment through proposed interchanges at NC 904 and Ocean Isle Beach Road. The alternative then turns to the northeast along existing US 17 Shallotte Bypass through a proposed interchange at US 17 Business/Old Shallotte Road. Alternative 7 ends just east of the existing US 17 Shallotte Bypass/NC 130 interchange in the same location as all of the Detailed Study Alternatives.

Alternative 8

Alternative 8 begins in Horry County, South Carolina in the same location as all of the Detailed Study Alternatives at the existing Carolina Bays Parkway (SC 31)/SC 9 interchange. The alternative follows the southernmost alignment of the Detailed Study Alternatives from the SC 9 interchange to a proposed interchange at Little River Road near Blooms Drive. Alternative 8 then turns almost due east to a proposed interchange at Mineola Avenue approximately 1,100 feet south of Lewisfield Road. From here, the alternative turns to the northeast across the North Carolina State Line and intersects with Calabash Road at a proposed interchange near North Forest Lane.

Alternative 8 then continues to the east and ties into existing US 17 for a short distance until a proposed interchange approximately 1,500 feet south of the US 17/Hickman Road intersection. From here, the alternative follows the same alignment as Alternative 7 parallel to and just south of existing US 17 to a proposed interchange at Thomasboro Road (approximately 700 feet south of US 17). Alternative 8 then ties into existing US 17 a short distance to the east and continues along the existing alignment through proposed interchanges at NC 904 and Ocean Isle Beach Road. The alternative then turns to the northeast along existing US 17 Shallotte Bypass through a proposed interchange at US 17 Business/Old Shallotte Road. Alternative 8 ends just east of the existing US 17 Shallotte Bypass/NC 130 interchange in the same location as all of the Detailed Study Alternatives.

2.4 SCDOT/NCDOT Preferred Alternative

Although all of the Detailed Study Alternatives are still under consideration, Alternative 4 has been identified by both the SCDOT and the NCDOT as those agencies' Preferred Alternative. A final decision on the alternative selection will not be made until comments received on the DEIS and at the corridor public hearing have been fully evaluated. After the corridor public hearing, the Merger Team will meet to select the Applicant's Preferred/Least Environmentally Damaging Practicable Alternative (LEDPA) corridor in accordance with the procedures detailed in the NEPA/Section 404 Merger Process, which includes consideration of public comments and the local sponsors' Preferred Alternative. According to the Merger Process, the Applicant's Preferred/LEDPA corridor is the best solution to the problem satisfying the transportation need and considering environmental and community resources. Once the

Merger Team concurs on the Applicant's Preferred/LEDPA corridor, the final decision on the Applicant's Preferred/LEDPA corridor will not be made until after USACE has applied the Section 404(b)(1) guidelines to a submitted permit application and completed the public interest review process for the proposed project. The Section 404(b)(1) guidelines govern the review of proposed discharges of dredged or fill material into Waters of the United States or adjacent wetlands. All applications for authorization to discharge pollutants into Waters of the United States must comply with the 404(b)(1) guidelines prior to being authorized by the USACE.

The SCDOT and NCDOT considered all available project data collected through the project development and design processes including traffic operations analyses, natural environmental impact data, human environment impact data, roadway design data, preliminary cost estimates, and public input to compare and contrast the Detailed Study Alternatives.

Alternative 4 has the lowest number of residential displacements, estimated to be 39, and the lowest number of identified noise receptor impacts (along with Alternative 4A) among the Detailed Study Alternatives. All of the Detailed Study Alternatives cross the 100-year floodplain in North Carolina. In comparison to the other Detailed Study Alternatives, Alternative 4 has moderate impacts to the 100-year floodplain. Other resources impacted, such as wetlands and streams, are also considered moderate in relation to the other Detailed Study Alternatives, although the expected linear feet of High-Quality Waters (HQWs) impacted is high.

After considering the impacts and the potential to further minimize some of the impacts following public involvement, SCDOT and NCDOT agreed that Alternative 4 is the Preferred Alternative for each agency.

2.5 Construction Phase 1 Scenarios

Currently NCDOT has not identified the financial resources to construct the Carolina Bays Parkway Extension project in its entirety within North Carolina. Therefore, the overall project will be constructed in phases. A first construction phase, Construction Phase 1, has been identified and involves construction of the proposed project from the southern terminus at SC 9 near Little River to just across the North Carolina/South Carolina border in western Brunswick County along the alignment of one of the Detailed Study Alternatives described above in Section 2.3. Subsequent construction phases have not yet been identified.

Two scenarios for the completion of Construction Phase 1 (CP1 – S1 and CP1 – S2) have been developed and are evaluated in this DEIS. CP1 – S1 and CP1 – S2 are described in detail below. Each of the seven Detailed Study Alternatives can be constructed with either Construction Phase 1 scenario. The basic difference between the two scenarios is that CP1 – S1 would consist of constructing the first phase of the project from SC 9 to S-111 (entirely within South Carolina), whereas CP1 – S2 would terminate in western Brunswick County in North Carolina. Both CP1 – S1 and CP2 – S2 include improvements to existing roadways in the project study area outside of the corridors for the Detailed Study Alternatives.

Construction Phase 1 – Scenario 1

CP1 – S1 would be constructed if NCDOT does not have any initial funding for Construction Phase 1 of the proposed project. CP1 – S1 begins in Horry County, South Carolina in the same location as all of the Detailed Study Alternatives at the existing Carolina Bays Parkway (SC 31)/SC 9 interchange. CP1 – S1 follows the same alignment described in Section 2.3 for all of the Detailed Study Alternatives to the north of SC 9, but the new location freeway portion of CP1 – S1 terminates at a proposed signalized

intersection at Little River Road (S-111) for all of the Detailed Study Alternatives. The alignment for CP1 – S1 then continues to the southeast along Little River Road/Brooksville Road (S-111) to Mineola Avenue (S-50), where it turns to the south and follows Mineola Avenue before ending at existing US 17.

A new traffic signal and additional turning lanes on all intersection approaches are proposed at the existing Brooksville Road/Mineola Avenue intersection with CP1 – S1. An additional southbound left-turn lane and a separate southbound right-turn lane on Mineola Avenue, as well as a separate westbound right-turn lane on US 17, are proposed at the existing US 17/Mineola Avenue intersection. A new traffic signal and additional turn lanes were recently constructed at the existing Little River Road/ Wampee Road intersection under SCDOT STIP Project P038944. However, CP1 – S1 includes additional proposed lane improvements at the intersection, including a separate right-turn lane on northwest bound Little River Road and an additional left turn lane on southwest bound Wampee Road. In addition, CP1 – S1 includes roadway shoulder improvements to the existing sections of Little River Road/ Brooksville Avenue and Mineola Avenue that the scenario follows.

Construction Phase 1 – Scenario 2

CP1 – S2 would be constructed if NCDOT is able to obtain sufficient funding for extending Construction Phase 1 of the proposed project into North Carolina during the initial stage of project construction. If CP1 – S2 is initially constructed, then the improvements outside of the corridors for the Detailed Study Alternatives in South Carolina (e.g., along S-111 and Mineola Avenue) associated with CP1 – S1 would not be necessary. CP1 – S2 begins in Horry County, South Carolina in the same location as all of the Detailed Study Alternatives at the existing Carolina Bays Parkway (SC 31)/SC 9 interchange. The alternative follows the same alignment described in Section 2.3 for all of the Detailed Study Alternatives to the north of SC 9 in South Carolina, including the same proposed interchange at Little River Road (S-111) (and Mineola Avenue for Alternative 8), but the new location freeway portion of CP1 – S2 terminates at the first proposed interchange location in North Carolina for all of the Detailed Study Alternatives.

For Alternatives 1, 1A, 2, 4 and 4A, the new location freeway portion of CP1 – S2 terminates at a partial interchange at Ash Little River Road, with the freeway entrance/exit ramps intersecting Ash Little River Road at two proposed roundabouts. The alignment for CP1 – S2 then continues to the south along existing Ash Little River Road to Hickman Road, where it turns to the east and follows Hickman Road before ending at existing US 17. A new traffic signal and additional turning lanes on all intersection approaches are proposed at the existing Hickman Road/Ash Little River Road/Calabash Road intersection with CP1 – S2. In addition, CP1 – S2 includes roadway shoulder improvements to the existing sections of Ash Little River Road and Hickman Road that the scenario follows.

For Alternative 7, the new location freeway portion of CP1 – S2 would terminate at an intersection at McLamb Road. The CP1 – S2 alignment then continues to the north along McLamb Road/Calabash Road to Hickman Road, where it turns to the east and follows Hickman Road before ending at existing US 17. A new traffic signal and additional turning lanes on all intersection approaches are proposed at the existing Hickman Road/Ash Little River Road/Calabash Road intersection with CP1 – S2. In addition, CP1 – S2 includes roadway shoulder improvements to the existing sections of Mclamb Road, Calabash Road, and Hickman Road that the scenario follows.

For Alternative 8, the new location freeway portion of CP1 – S2 would terminate at US 17 near the existing Calabash Road/US 17 intersection. No additional work outside the existing Alternative 8 corridor would be needed for CP1 – S2 for Alternative 8.

CP1 – S1 would be completely constructed in South Carolina, so it would not involve any financial commitment by NCDOT, whereas CP1 – S2 extends slightly into North Carolina so funding would be required from NCDOT for its construction.

2.6 Funding for Preferred Alternative

The proposed Carolina Bays Parkway Extension project is considered a Major Project by the Federal Highway Administration (FHWA) because the projected cost of the project exceeds $500,000,000. As such, a Financial Plan is required to ensure that the necessary financial resources are identified, available, and managed throughout the life of the project. The proposed Carolina Bays Parkway Extension project is currently funded in the SCDOT 2024-2033 STIP (Project P029554), with right-of-way acquisition planned to begin in 2026 and construction in 2028. The proposed project is not, however, currently funded for right-of-way acquisition or construction in the NCDOT 2024-2033 STIP (Project R-5876). NCDOT will determine options for financing the proposed project in North Carolina, and the Financial Plan will be included in the FEIS. Because there are currently insufficient financial resources available to complete the entire Carolina Bays Parkway Extension project within North Carolina, the overall project will be constructed in phases as discussed in Section 2.5. Construction Phase 1 involves completion of the Carolina Bays Parkway Extension in South Carolina by constructing the proposed project from the southern terminus at SC 9 near Little River to just across the North Carolina/South Carolina border in western Brunswick County along the alignment of one of the Detailed Study Alternatives described above in Section 2.3. Two scenarios have been developed for the completion of Construction Phase 1 (CP1 – S1 and CP1 – S2) (see Section 2.5). CP1 – S1 involves construction only in South Carolina and would be constructed if NCDOT does not have any initial funding for Construction Phase 1 of the proposed project. CP1 – S2 extends into western Brunswick county and would be constructed if NCDOT is able to obtain sufficient funding for extending Construction Phase 1 of the proposed project into North Carolina during the initial stage of project construction.

2.7 Detailed Study Alternatives Design Criteria

2.7.1 Design Speed

A 75 miles per hour (mph) design speed (70 mph posted speed limit) is proposed for the Carolina Bays Parkway Extension.

2.7.2 Typical Sections

The typical sections used for the proposed Carolina Bays Parkway Extension are influenced by the type of facility required to fulfill the project's purpose and need. The number of proposed lanes included in the typical sections is based on providing capacity for existing and future traffic. Traffic operations analyses are discussed in detail in Section 2.8. The desirable traffic service for the proposed project in the 2045 design year is based on the respective LOS goals for each state. SCDOT has established a goal of LOS C for traffic service for its state roads, while NCDOT has established a target goal of LOS D for traffic service for its state roads for system level planning analysis.

Based on the traffic analyses conducted for the proposed project, it was determined that a four-lane median-divided typical section will accommodate the future year 2045 estimated traffic volumes. However, four- and six-lane median-divided sections are proposed for the South Carolina portion of the

project because existing Carolina Bays Parkway is six lanes at SC 9. The proposed facility will begin as six lanes for a short distance to the south of the SC 9 interchange to match the existing typical section, but it will transition to four lanes at the southern interchange ramps. For the North Carolina portion of the project, a four-lane median-divided typical section is proposed, along with a four-lane median-divided with frontage roads typical section which would primarily be used along improved sections of existing US 17. The proposed typical sections for the Carolina Bays Parkway Extension in both South Carolina and North Carolina are described below and shown on Figures 13A and 13B. As discussed below, the proposed four-lane median-divided typical sections vary slightly due to specific design criteria for each state, but the same conceptual footprint is used for both North Carolina and South Carolina. The project is a proposed freeway facility; therefore, no bicycle lanes or sidewalks are proposed.

South Carolina

Through the South Carolina portion of the project, the proposed facility would be primarily a four-lane median-divided facility; though a six-lane section would be used for a short distance south of the SC 9 interchange to match the existing Carolina Bays Parkway typical section.

- **SCDOT Typical Section 1 – *Four-lane median-divided*:** The proposed four-lane median-divided typical section has 12-foot travel lanes and 12-foot outside shoulders (ten-foot paved). It has a 48-foot median containing ten-foot inside shoulders (four-foot paved) in each direction. It has a total pavement width of 76 feet (38 feet in each direction) (see Figure 13A).
- **SCDOT Typical Section 2 – *Six-lane median-divided*:** The proposed six-lane median-divided typical section also has 12-foot travel lanes and 12-foot outside shoulders (ten-foot paved). Typical Section 2 also has a 48-foot median, but the median contains 12-foot inside shoulders (ten-foot paved) in each direction. It has a total pavement width of 112 feet (56 feet in each direction) (see Figure 13A). This typical section matches the existing Carolina Bays Parkway (SC 31) cross-section.

North Carolina

All of the Detailed Study Alternative segments through the North Carolina portion of the study area contain a combination of both new and existing location segments. In some locations where the proposed project travels along existing US 17 for Alternatives 1, 2, 4, 7, and 8, as well as a short section of Hickman Road for Alternative 2, a frontage road system is needed in addition to the main travel lanes to provide access to adjacent properties.

- **NCDOT Typical Section 1 – *Four-lane median-divided*:** The proposed four-lane median-divided typical section has 12-foot travel lanes with 12-foot outside shoulders (ten-foot paved). It has a 46-foot median containing six-foot inside shoulders (four-foot paved) in each direction. It has a total pavement width of 76 feet (38 feet in each direction) (see Figure 13B).
- **NCDOT Typical Section 2 – *Four-lane median-divided with frontage roads*:** The proposed four-lane median-divided with frontage roads typical section has the same lane, shoulder, and median widths as those proposed for NCDOT Typical Section 1. It includes frontage roads along each side of the mainline, although in some locations the frontage road is needed only along one side of the mainline. The frontage roads consist of two undivided travel lanes (12-foot) with unpaved shoulders. The total pavement width is 124 feet (38 feet in each direction along the mainline and 24 feet in each direction along the frontage roads) (see Figure 13B).

As indicated on Figure 13B, some portions of US 17 in North Carolina have an existing 58-foot median width, and both proposed NCDOT typical sections will use the wider existing median width in areas where the proposed project travels along such portions of existing US 17.

2.7.3 Proposed Right-of-Way and Type of Access

Full control of access is proposed for the Carolina Bays Parkway Extension. Table 2-1 lists the proposed interchange locations for all Detailed Study Alternatives. The proposed interchange locations are also described in Sections 2.3 and 2.5, and shown on Figure 12A. In North Carolina, frontage roads are proposed along some of the sections of Alternatives 1, 2, 4, 7, and 8 that involve widening existing US 17, as well as along a short section of Alternative 2 that travels along existing Hickman Road. The proposed right-of-way width for all of the Detailed Study Alternatives is generally 300 feet, but the right-of-way width may be variable along sections of the proposed project with wider typical sections due to additional lanes and/or the inclusion of frontage roads.

Table 2-1. Proposed Interchange Locations

Proposed Interchange	Location	State	Detailed Study Alternative(s)
A	Carolina Bays Parkway (SC 31)/SC 9	SC	All Detailed Study Alternatives
B	S-57 (Wampee Road)/S-111 (Little River Road)	SC	1, 1A, 2
C	S-111 (Little River Rd) 3,000 feet south of S-57 (Wampee Rd)	SC	4, 4A, 7
D	S-111 (Little River Road) near Blooms Drive	SC	8
E	S-50 (Mineola Avenue) 1,100 feet south of Lewisfield Road	SC	8
F	SR 1300 (Ash Little River Road) 2,000 feet north of SR 1303 (Hickman Road)	NC	1, 1A, 2, 4, 4A
G	SR 1300 (Calabash Road) near Meadowlands Trail	NC	7
H	SR 1300 (Calabash Road) near North Forest Lane	NC	8
I	US 17 1,500 ft south of SR 1303 (Hickman Road)	NC	7
J	Near SR 1303 (Hickman Road) and US 17	NC	2
K	SR 1165 (Thomasboro Road) 700 feet south of US 17	NC	8
L	US 17/SR 1165 (Thomasboro Rd)/SR 1304 (Pea Landing Rd)	NC	2
M	SR 1304 (Pea Landing Road) near Red Bird Lane	NC	1, 4
N	NC 904 (Longwood Road) near SR 1315 (Russtown Road)	NC	1A, 4A
O	US 17/NC 904 (Longwood Road)	NC	2, 7, 8
P	Near NC 904 (Longwood Road) and US 17	NC	1, 4
Q	US 17/SR 1184 (Ocean Isle Beach Road)	NC	1, 2, 4, 7, 8
R	US 17/US 17 Business/SR 1316 (Old Shallotte Road)	NC	1, 2, 4, 7, 8
S	US 17/NC 130 (Whiteville Road)	NC	All Detailed Study Alternatives

2.7.4 Major Hydraulic Structures

Table 2-2 lists the proposed major hydraulic structures for each of the seven Detailed Study Alternatives, including both Construction Phase 1 scenarios. With the exception of major hydraulic site 67, the NEPA/

Section 404 Merger Team concurred on the size and location of the structures at the September 30, 2021, Concurrence Point 2A (Bridging Decisions and Alignment Review) meeting, and a copy of the signed CP 2A concurrence form is included in Appendix B. The locations of the structures are shown on Figure 14.

Table 2-2. Proposed Major Hydraulic Structures

Site No.[1]	State	Stream ID	Wetland/ Pond ID	Detailed Study Alternatives	Existing Structure	Recommended Structure
6	SC	SHAB	---	1, 1A, 2, 4, 4A, 7	None	1 @ 8 ft x 8 ft RCBC[2]
7	SC	SHED	---	1, 1A, 2	None	1 @ 7 ft x 7 ft RCBC
8	SC	SHAB	---	8	None	1 @ 7 ft x 9 ft RCBC
10	SC	SHIC	---	1, 1A, 2	None	1 @ 12 ft x 8 ft RCBC
11	SC	SHEE, SHAE	---	4, 4A, 7, 8	None	1 @ 7 ft x 9 ft RCBC
12	SC	---	WP	1, 1A, 2	None	Dual Bridges (100-ft-long) and Service Road Bridge (100-ft-long)
13	SC	---	WHCM	4, 4A	None	1 @ 7 ft x 8 ft RCBC
14	SC	---	WHCM	4, 4A	None	Dual Bridges (100-ft-long)
15	SC	SHQA	---	7	None	1 @ 11 ft x 9 ft RCBC
16	NC	Hickman's Branch	---	1, 1A, 2, 4, 4A	None	1 @ 8 ft x 9 ft RCBC
17	SC	SHAF	---	8	None	1 @ 7 ft x 8 ft RCBC
18	SC	SHAF	---	8	None	1 @ 8 ft x 12 ft RCBC
21	NC	Cawcaw Swamp, Shingletree Swamp	---	1, 1A, 4, 4A	None	Dual Bridges (275-ft-long) and Service Road Bridge (370-ft-long)
22	NC	SBB	---	1, 1A, 4, 4A	None	1 @ 8 ft x 7 ft RCBC
23	NC	Shingletree Swamp	---	2	None	Dual Bridges (175-ft-long) and Service Road Bridge (175-ft-long)
26	NC	---	PCM	1, 1A, 4, 4A	None	1 @ 7 ft x 7 ft RCBC
29	NC	SHUC	---	7	None	Dual Bridges (110-ft-long)
31	NC	TAO	---	1, 1A, 4, 4A	None	1 @ 7 ft x 7 ft RCBC
32	NC	SHIG, SHIM	---	8	None	1 @ 8 ft x 9 ft RCBC
35	NC	SAP	---	2	3 @ 30 inch RCP[3]	1 @ 7 ft x 8 ft RCBC
36	NC	SHIH	---	8	2 @ 10 ft x 7 ft RCBC	2 @ 10 ft x 11 ft RCBC
37	NC	SAB	---	1, 1A, 4, 4A	None	1 @ 7 ft x 8 ft RCBC
38	NC	Little Cawcaw Swamp	---	2, 8	3 @ 72 inch RCP	2 @ 10 ft x 9 ft RCBC

Table 2-2. Proposed Major Hydraulic Structures (continued)

Site No.[1]	State	Stream ID	Wetland/ Pond ID	Detailed Study Alternatives	Existing Structure	Recommended Structure
39	NC	Little Cawcaw Swamp	---	7, 8	None	2 @ 8 ft x 11 ft RCBC
40	NC	Little Cawcaw Swamp	---	2, 7, 8	2 @ 84 inch CMP[4]	3 @ 8 ft x 11 ft RCBC
41	NC	Cawcaw Swamp	---	1, 1A, 4, 4A	None	Dual Bridges (150-ft-long)
43	NC	SCF	---	1, 1A, 4, 4A	None	1 @ 13 ft x 7 ft RCBC
46	NC	TBD	---	1, 1A, 4, 4A	None	1 @ 7 ft x 8 ft RCBC
48	NC	SVBH	---	1, 4	None	1 @ 12 ft x 7 ft RCBC
49	NC	---	WVCJ	1A, 4A	None	2 @ 10 ft x 7 ft RCBC
51	NC	SVAI, SBH	---	1, 4	None	1 @ 12 ft x 7 ft RCBC
53	NC	SVAN	---	1A, 4A	None	1 @ 7 ft x 8 ft RCBC
54	NC	SVAH	---	1, 2, 4, 7, 8	2 @ 8 ft x 6 ft RCBC	3 @ 10 ft x 8 ft RCBC
55	NC	SVBI	---	1A, 4A	None	2 @ 8 ft x 8 ft RCBC
56	NC	SVBJ	---	1A, 4A	None	1 @ 12 ft x 7 ft RCBC
57	NC	SVAE	---	1, 2, 4, 7, 8	3 @ 5 ft x 7 ft RCBC	2 @ 9 ft x 9 ft RCBC
59	NC	SVAB, SVAC	---	1, 2, 4, 7, 8	42 inch RCP	1 @ 8 ft x 7 ft RCBC
60	NC	McMilly Swamp	---	1A, 4A	None	2 @ 7 ft x 9 ft RCBC
61	NC	SBT	---	1A, 4A	None	1 @ 7 ft x 13 ft RCBC
62	NC	McMilly Swamp	---	1, 2, 4, 7, 8	4 @ 6 ft x 5 ft RCBC	4 @ 10 ft x 7 ft RCBC
64	NC	Lookout Branch	---	All Detailed Study Alternatives	4 @ 10 ft x 7 ft RCBC	4 @ 10 ft x 7 ft RCBC (retain and extend)
65	NC	SAA	---	All Detailed Study Alternatives	3 @ 12 ft x 8 ft RCBC	3 @ 12 ft x 8 ft RCBC (retain and extend)
67[5]	NC	Shingletree Swamp	---	1, 1A, 2, 4, 4 A, 7	3 @ 10 ft x 8 ft RCBC	3 @ 10 ft x 8 ft RCBC (retain and extend)

[1]Major hydraulic site numbers correspond to those in the *Preliminary Hydraulics Study for Environmental Impact* (NV5, April 2022), which is appended by reference. Sites 1-5, 9, 19, 20, 24, 25, 27, 28, 30, 33, 34, 42, 44, 45, 47, 50, 52, 58, 63, and 66 were determined during evaluations and analysis to be sites that did not qualify as major structures (i.e., less than 72-inch diameter); therefore these sites are not included in the table.
[2]Reinforced concrete box culvert. All proposed RCBCs to be buried one-foot.
[3]Reinforced concrete pipe.
[4]Corrugated metal pipe.
[5]The NEPA/Section 404 Merger Team has not concurred on the size and location of the recommended structure for major hydraulic site 67. Note that site 67 is located in North Carolina along the CP1 – S2 corridor on Hickman Road and would be included in all of the Detailed Study Alternatives except for Alternative 8.

2.8 Traffic Operations Analyses

2.8.1 Traffic Operations Analyses for Detailed Study Alternatives

The *Carolina Bays Parkway Extension Traffic Operations Analysis Technical Memorandum (Build Conditions)* (Mott MacDonald, December 2022), appended by reference, documents the build conditions traffic capacity analyses for the seven Detailed Study Alternatives evaluated in this DEIS in comparison to the No-Build Alternative. The traffic capacity analyses for the Detailed Study Alternatives are based on the updated October 2020 traffic forecasts for future year 2045 for both Average Annual Daily Traffic (AADT) and Average Summer Weekday Traffic (ASWT) conditions. The seven Detailed Study Alternatives and the No-Build Alternative were evaluated using TransModeler in terms of Measures of Effectiveness (MOEs), which are system-wide performance measurements such as control delay, intersection and freeway level of service (LOS), and queue lengths. Each of the TransModeler models utilized in this analysis were developed based on NCDOT's *Congestion Management Simulation Guidelines* for TransModeler (effective October 1, 2016) and also included the NCDOT default parameters file (dated January 2019). The traffic capacity analyses also include 2045 travel times analysis for the seven Detailed Study Alternatives and the No-Build Alternative. Details of the methodology and analyses supporting the information provided in this section are provided in the December 2022 traffic technical report.

2.8.1.1 Year 2045 Build Traffic Projections

Table 2-3 compares projected future year 2045 AADT volumes in vehicles per day (vpd) for major study area roadways for the seven Detailed Study Alternatives and the No-Build Alternative. Table 2-4 provides the same comparisons for 2045 ASWT volumes. Year 2045 projected AADT volumes for the seven Detailed Study Alternatives and the surrounding roadway network are shown on Figures 15A through 15U, and Figures 16A through 16U show the 2045 projected ASWT volumes.

As shown in Table 2-3 and Table 2-4, the 2045 traffic forecasts for the seven Detailed Study Alternatives indicate that US 17, S-57 (Wampee Road)/SR 1303 (Hickman Road), and SC 9 are expected to have substantially lower future traffic volumes under both AADT and ASWT conditions with the completion of the proposed project. In South Carolina, the proposed project is forecast to divert approximately 30 percent to 60 percent of the future traffic away from US 17, as well as approximately 30 to 50 percent away from Wampee Road, depending on the Detailed Study Alternative. In North Carolina, the proposed project is forecast to divert approximately 50 to 60 percent of the future traffic away from Hickman Road. As a result of the future traffic volume reductions, traffic flow conditions will be substantially improved on these roadways when compared with the traffic flow conditions under the No-Build Alternative.

For US 17 in North Carolina, the location of the proposed Carolina Bays Parkway Extension/US 17 interchange varies by Detailed Study Alternative. As shown in Table 2-3 and Table 2-4, the existing portion of US 17 to the west of the proposed interchange for each Detailed Study Alternative is forecast to experience a substantial decrease in future 2045 traffic volumes under both AADT and ASWT conditions, whereas the portion of US 17/proposed Carolina Bays Parkway Extension that would be improved to a freeway facility to the east of the proposed interchange is forecast to experience an increase in future traffic volumes. NC 904 is also forecast to experience an increase in traffic volumes as future traffic is expected to use the roadway to access the proposed Carolina Bays Parkway Extension/ NC 904 interchange for each Detailed Study Alternative.

Table 2-3. 2045 AADT Volumes for No-Build and Detailed Study Alternatives

Roadway Segment	2045 AADT Volumes (vpd) by Detailed Study Alternative							
	No Build	1	1A	2	4	4A	7	8
South Carolina								
US 17 north of SC 9 to US 17 at North Carolina State Line	23,100 – 59,500	10,100 – 43,700	9,500 – 43,000	10,300 – 44,000	9,900 – 43,500	9,700 – 42,600	9,900 – 43,100	12,100 – 44,400
S-57 (Wampee Rd) west of SC 9 to S-57 east of S-111 (Little River Rd)	13,700 – 19,900	7,200 – 13,300	7,400 – 13,300	6,600 – 13,100	7,000 – 13,400	6,700 – 13,400	6,300 – 13,300	5,400 – 13,300
SC 9 north of US 17 to SC 9 north of S-57 (Wampee Road)	33,300 – 49,100	29,200 – 42,500	29,100 – 42,600	28,600 – 42,600	28,600 – 43,900	28,700 – 43,700	27,900 – 44,000	26,500 – 45,500
Sea Mountain Hwy south of SC 90 to Sea Mountain Hwy south of SC 9	13,600 – 16,900	14,200 – 17,000	14,200 – 17,000	14,200 – 17,000	14,400 – 16,800	14,400 – 16,800	14,100 – 16,900	13,900 – 16,600
SC 31 west of SC 9	49,200	55,000	55,000	55,200	54,900	54,900	55,200	54,700
SC 90 west of US 17 to SC 90 west of Sea Mountain Highway	16,300 – 17,300	14,500 – 15,900	14,500 – 15,900	14,500 – 15,900	14,300 – 15,900	14,300 – 15,900	14,500 – 15,900	14,100 – 15,800
Carolina Bays Parkway Extension north of SC 9 to North Carolina State Line	NA	33,000 – 34,500	33,700 – 35,100	33,400 – 35,400	33,200 – 35,200	33,800 – 35,900	35,000 – 36,600	32,800 – 35,800
North Carolina								
US 17 at South Carolina State Line to US 17 north of NC 130	23,000 – 40,700	NA	NA	NA	NA	NA	NA	NA
US 17 at South Carolina State Line to US 17 west of Carolina Bays Parkway Extension interchange[1]	NA	10,600 – 14,100	10,000 – 22,400	10,900 – 12,000	10,500 – 14,300	10,000 – 22,500	7,100 – 12,700	7,400 – 12,700
US 17 east of Carolina Bays Parkway Extension interchange to US 17 north of NC 130[1]	NA	36,100 – 45,900	35,800 – 41,400	33,900 – 45,700	36,100 – 45,900	35,900 – 41,500	36,200 – 45,700	36,300 – 45,800
SR 1303 (Hickman Rd) west of SR 1300 (Ash Little River Rd/Calabash Rd) to SR 1303 west of US 17	13,700 – 15,100	7,700 – 9,000	8,300 – 9,300	4,900 – 7,500	7,600 – 9,200	8,400 – 9,600	7,400 – 8,200	4,600 – 6,800
NC 904 (Seaside Rd) south of US 17 to NC 904 (Longwood Rd) north of SR 1304 (Pea Landing Rd)	7,700 – 16,500	7,200 – 17,900	8,800 – 18,200	8,100 – 17,300	7,200 – 17,900	8,800 – 18,100	7,900 – 17,300	7,500 – 17,300
NC 130 west of US 17 SB ramps to NC 130 east of US 17 NB ramps	15,400 – 16,200	15,600 – 16,600	15,600 – 17,000	15,900 – 16,200	15,600 – 16,600	15,500 – 17,100	15,900 – 16,200	15,900 – 16,200
Carolina Bays Parkway Extension from South Carolina State Line to west of US 17 interchange	NA	26,300 – 33,000	24,800 – 33,700	30,900 – 33,400	26,600 – 33,200	25,000 – 33,800	32,100 – 35,000	31,400 – 33,200

[1]As shown of Figures 12A through 12H, the extents of the two existing US 17 segments in North Carolina vary by Detailed Study Alternative based on the location of the Carolina Bays Parkway Extension/US 17 interchange.

Table 2-4. 2045 ASWT Volumes for No-Build and Detailed Study Alternatives

Roadway Segment	2045 ASWT Volumes (vpd) by Detailed Study Alternative							
	No Build	1	1A	2	4	4A	7	8
South Carolina								
US 17 north of SC 9 to US 17 at North Carolina State Line	27,400 – 67,800	11,900 – 49,700	11,200 – 49,000	13,200 – 50,200	12,700 – 49,500	12,200 – 48,600	12,100 – 49,200	14,400 – 50,600
S-57 (Wampee Rd) west of SC 9 to S-57 east of S-111 (Little River Rd)	15,000 – 22,400	8,300 – 14,400	8,600 – 14,400	7,700 – 14,200	8,000 – 14,400	7,700 – 14,500	7,300 – 14,400	6,300 – 14,400
SC 9 north of US 17 to SC 9 north of S-57 (Wampee Road)	38,700 – 55,400	33,800 – 47,800	33,700 – 48,000	33,200 – 48,000	33,200 – 49,500	33,300 – 49,300	32,400 – 49,600	30,700 – 51,300
Sea Mountain Hwy south of SC 90 to Sea Mountain Hwy south of SC 9	15,200 – 18,700	15,900 – 18,800	15,900 – 18,800	15,900 – 18,800	16,100 – 18,600	16,100 – 18,600	15,800 – 18,700	15,600 – 18,400
SC 31 west of SC 9	56,200	62,800	62,800	63,000	62,700	62,700	62,900	62,400
SC 90 west of US 17 to SC 90 west of Sea Mountain Highway	18,600 – 19,600	16,500 – 17,900	16,500 – 17,900	16,500 – 17,900	16,300 – 17,900	16,300 – 17,900	16,500 – 17,900	16,100 – 17,800
Carolina Bays Parkway Extension north of SC 9 to North Carolina State Line	NA	37,700 – 39,400	38,500 – 40,100	38,100 – 40,400	37,900 – 40,200	38,600 – 40,900	40,000 – 41,800	37,400 – 40,900
North Carolina								
US 17 at South Carolina State Line to US 17 north of NC 130	26,100 – 45,900	NA	NA	NA	NA	NA	NA	NA
US 17 at South Carolina State Line to US 17 west of Carolina Bays Parkway Extension interchange[1]	NA	12,000 – 16,100	11,300 – 25,200	14,100 – 14,600	13,300 – 16,300	11,300 – 25,300	8,100 – 14,800	8,300 – 14,900
US 17 east of Carolina Bays Parkway Extension interchange to US 17 north of NC 130[1]	NA	41,300 – 51,700	41,000 – 47,100	38,700 – 51,400	41,300 – 51,700	41,100 – 47,200	41,500 – 51,700	41,500 – 51,700
SR 1303 (Hickman Rd) west of SR 1300 (Ash Little River Rd/Calabash Rd) to SR 1303 west of US 17	16,000 – 17,300	9,100 – 10,100	9,900 – 10,700	5,600 – 8,600	9,000 – 10,500	9,800 – 11,000	8,900 – 9,200	5,300 – 7,700
NC 904 (Seaside Rd) south of US 17 to NC 904 (Longwood Rd) north of SR 1304 (Pea Landing Rd)	8,100 – 19,100	7,600 – 20,600	9,300 – 20,800	8,600 – 20,000	7,600 – 20,700	9,300 – 20,700	8,300 – 19,900	7,800 – 20,000
NC 130 west of US 17 SB ramps to NC 130 east of US 17 NB ramps	17,300 – 18,300	17,600 – 18,600	17,600 – 19,100	17,900 – 18,200	17,600 – 18,600	17,500 – 19,200	17,900 – 18,200	17,900 – 18,200
Carolina Bays Parkway Extension from South Carolina State Line to west of US 17 interchange	NA	30,000 – 37,700	28,300 – 38,500	35,300 – 38,100	30,400 – 37,900	28,500 – 38,600	36,600 – 40,000	35,800 – 37,900

[1]As shown of Figures 12A through 12H, the extents of the two existing US 17 segments in North Carolina vary by Detailed Study Alternative based on the location of the Carolina Bays Parkway Extension/US 17 interchange.

Existing Carolina Bays Parkway (SC 31) to the west of the SC 9 interchange is forecast to experience an approximately 10 percent increase in future 2045 traffic volumes under both AADT and ASWT conditions with the proposed extension of the facility. The future traffic volumes on the Carolina Bays Parkway

Extension are projected to be relatively similar for the seven Detailed Study Alternatives in both South Carolina and North Carolina. For both AADT and ASWT conditions, Alternative 7, which is the shortest and most direct route between the project termini, is forecast to carry the highest future traffic volumes. In general, Alternatives 1, 1A, 4, and 4A (i.e., the four alternatives located primarily on new location along the northern side of the study area) are anticipated to carry slightly lower traffic volumes overall than Alternatives 2, 7, and 8 (i.e., the three alternatives located primarily in the central and southern portions of the study area that would follow longer sections of existing US 17). The reason the northern alternatives are forecast to carry lower traffic volumes is that they are anticipated to serve mostly regional trips attempting to bypass the heavily congested area along US 17 in South Carolina, whereas the central and southern alternatives would provide shorter and more direct connections to existing US 17, thereby providing a reasonable alternative route choice for local trips within the southwestern portion of the study area.

2.8.1.2 Year 2045 Build Capacity Analysis

Table 2-5 provides a summary comparison of the future year 2045 freeway segment and intersection/ interchange LOS under AADT volume conditions for the seven Detailed Study Alternatives and the No-Build Alternative. The comparison is provided for both the overall project study area and for locations within the project construction limits. Table 2-6 provides the same summary comparison for ASWT volume conditions. As shown in these tables, the study area analyzed in the traffic capacity analysis for the seven Detailed Study Alternatives encompasses multiple intersections, interchanges, and freeway segments that are outside of the anticipated construction limits for the proposed project, so they will not be directly impacted by construction of the project. However, these locations are anticipated to experience some improvement in traffic operations by virtue of reduced volumes rather than geometric improvements. Figures 17A through 17N summarize 2045 intersection, interchange, and freeway segment LOS for the seven Detailed Study Alternatives for AADT conditions, for both the AM and PM peak hours, and Figures 18A through 18N summarize the same information for 2045 ASWT conditions.

As shown in Table 2-5, approximately 77 percent of the freeway segments and 69 percent of the intersections are anticipated to operate at an acceptable LOS with the No-Build Alternative under 2045 AADT conditions. With higher traffic volumes under 2045 ASWT conditions, the percentage of freeway segments and intersections operating at an acceptable LOS with the No-Build Alternative is expected to drop to approximately 57 percent and 51 percent, respectively, as shown in Table 2-6.

The results in Table 2-5 also show that approximately 93 percent to 98 percent of all freeway segments and intersections in the overall study area for each Detailed Study Alternative are anticipated to operate at an acceptable LOS under 2045 AADT conditions. The results in Table 2-6 show the percentage of all freeway segments and intersections operating at an acceptable LOS in the overall study area under 2045 ASWT conditions is slightly lower, at approximately 84 percent to 95 percent. However, it is notable that 100 percent of the freeway segments within the anticipated construction limits are anticipated to operate at an acceptable LOS under both 2045 AADT and 2045 ASWT conditions for all of the Detailed Study Alternatives. In addition, 100 percent of the intersections within the anticipated construction limits are anticipated to operate at an acceptable LOS under both 2045 AADT and 2045 ASWT conditions for all of the Detailed Study Alternatives except for Alternative 4A (91 percent acceptable LOS under 2045 ASWT Conditions), Alternative 7 (89 percent acceptable LOS under 2045 ASWT conditions), and Alternative 8 (97 percent acceptable LOS under 2045 AADT conditions). Based on the results of the 2045 freeway segment and intersection/interchange LOS analysis, all of the Detailed Study Alternatives would meet the purpose of and need for the proposed project.

Table 2-5. 2045 AADT Level of Service Summary for No-Build and Detailed Study Alternatives

Detailed Study Alternatives	Type	Overall Study Area			Within Limits of Construction		
		Acceptable LOS*	Unacceptable LOS*	Percent Acceptable	Acceptable LOS*	Unacceptable LOS*	Percent Acceptable
No-Build	Freeway	27	8	77.1	N/A	N/A	N/A
	Intersections	31	14	68.9	N/A	N/A	N/A
Alternative 1	Freeway	104	3	97.2	87	0	100.0
	Intersections	54	2	96.4	26	0	100.0
Alternative 1A	Freeway	64	3	95.5	52	0	100.0
	Intersections	55	1	98.2	13	0	100.0
Alternative 2	Freeway	106	3	97.2	94	0	100.0
	Intersections	51	1	98.1	27	0	100.0
Alternative 4	Freeway	106	2	98.1	93	0	100.0
	Intersections	51	4	92.7	23	0	100.0
Alternative 4A	Freeway	64	3	95.5	52	0	100.0
	Intersections	52	3	94.5	11	0	100.0
Alternative 7	Freeway	98	2	98.0	85	0	100.0
	Intersections	57	1	98.3	27	0	100.0
Alternative 8	Freeway	110	2	98.2	97	0	100.0
	Intersections	53	3	94.6	30	1	96.8

*Note that SCDOT has established a goal of LOS C for its state roads, while NCDOT has established the target goal of LOS D for system level planning analysis.

The December 2022 traffic technical report summarizes the results of the traffic capacity analyses for the seven Detailed Study Alternatives and the No-Build Alternative under future year 2045 AADT and ASWT conditions in detailed MOE summary tables. The MOEs included are freeway segment/ interchange LOS, and signalized, unsignalized, and proposed roundabout intersection LOS, delay, and queue length. Table 2-7 and Table 2-8 summarize the LOS and associated delay for the signalized intersections analyzed within the study area for the seven Detailed Study Alternatives and the No-Build Alternative under future year 2045 AADT and ASWT conditions, respectively. As shown in Table 2-7, five out of the ten currently signalized intersections in South Carolina are anticipated to operate at an unacceptable LOS (LOS D or worse) in at least one of the peak hours under 2045 AADT conditions with the No-Build Alternative. For 2045 build conditions in South Carolina, overall signalized intersection LOS is expected to improve substantially with all of the Detailed Study Alternatives in comparison to the No-Build Alternative. Only one intersection (SC 90/Sea Mountain Highway) is anticipated to operate at an unacceptable LOS with all of the Detailed Study Alternatives in both the AM and PM peak hours. Alternatives 1A, 2, and 7 are not expected to have any additional signalized intersections operating at an unacceptable LOS in either the AM or PM peak hours. In North Carolina under 2045 AADT conditions, all signalized intersections analyzed are expected to operate at an acceptable LOS (LOS D or better) in both peak hours with the No-Build Alternative and with all of the Detailed Study Alternatives.

Table 2-6. 2045 ASWT Level of Service Summary for No-Build and Detailed Study Alternatives

Detailed Study Alternatives	Type	Overall Study Area			Within Limits of Construction		
		Acceptable LOS*	Unacceptable LOS*	Percent Acceptable	Acceptable LOS*	Unacceptable LOS*	Percent Acceptable
No-Build	Freeway	20	15	57.1	N/A	N/A	N/A
	Intersections	23	22	51.1	N/A	N/A	N/A
Alternative 1	Freeway	96	11	89.7	87	0	100.0
	Intersections	52	4	92.9	26	0	100.0
Alternative 1A	Freeway	56	11	83.6	52	0	100.0
	Intersections	53	3	94.6	13	0	100.0
Alternative 2	Freeway	101	8	92.7	94	0	100.0
	Intersections	49	3	94.2	27	0	100.0
Alternative 4	Freeway	101	7	93.5	93	0	100.0
	Intersections	50	5	90.9	23	0	100.0
Alternative 4A	Freeway	60	7	89.6	52	0	100.0
	Intersections	52	3	94.5	10	1	90.9
Alternative 7	Freeway	92	8	92.0	85	0	100.0
	Intersections	50	8	86.2	24	3	88.9
Alternative 8	Freeway	101	11	90.2	97	0	100.0
	Intersections	50	6	89.3	31	0	100.0

*Note that SCDOT has established a goal of LOS C for its state roads, while NCDOT has established the target goal of LOS D for system level planning analysis.

As shown in Table 2-8, all ten currently signalized intersections analyzed in South Carolina are anticipated to operate at an unacceptable LOS (LOS D or worse) in at least one of the peak hours under 2045 ASWT conditions with the No-Build Alternative. For 2045 build conditions, once again overall signalized intersection LOS is expected to improve substantially with all of the Detailed Study Alternatives in comparison to the No-Build Alternative. Only two intersections (SC 90/Sea Mountain Highway and SC 9/S-57) are anticipated to operate at an unacceptable LOS in at least one of the peak hours with all of the Detailed Study Alternatives. For Alternative 4A, there are no additional signalized intersections expected to operate at an unacceptable LOS in either peak hour. Alternative 7 has the most (five) additional intersections expected to operate at an unacceptable LOS in at least one of the peak hours, including two intersections expected to operate at LOS F in the PM peak hour. In North Carolina under 2045 ASWT conditions, two of the currently signalized intersections analyzed are expected to operate at an unacceptable LOS (LOS E or F) in at least one of the peak hours with the No-Build Alternative. For 2045 build conditions in North Carolina, all of the intersections analyzed are expected to operate at an acceptable LOS in both peak hours with all of the Detailed Study Alternatives. In summary, the results of the traffic capacity analyses indicated that all of the Detailed Study Alternatives would substantially reduce delay at most of the signalized and unsignalized intersections analyzed in the overall study area under all future 2045 conditions in comparison to the No-Build Alternative. Based on the results of the 2045 signalized intersection LOS analysis, all of the Detailed Study Alternatives would meet the purpose of and need for the proposed project.

Table 2-7. 2045 AADT Signalized Intersection Level of Service for No-Build and Detailed Study Alternatives

Int. No.[1]	Intersection Name	No Build		Alternative 1		Alternative 1A		Alternative 2		Alternative 4		Alternative 4A		Alternative 7		Alternative 8	
		Delay in Seconds (LOS)[2]															
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
South Carolina																	
1	SC 9/S-57 (Wampee Rd)	**126.1 (F)**	**101.9 (F)**	30.6 (C)**	25.9 (C)	31.2 (C)*	25.8 (C)*	34.0 (C)**	25.3 (C)*	32.1 (C)**	29.7 (C)**	30.6 (C)**	26.0 (C)*	30.9 (C)**	25.9 (C)*	33.2 (C)**	25.4 (C)*
2	SC 9/SC 31 SB Off Ramp[3]	NA	NA	24.6 (C)*	18.2 (B)	23.3 (C)*	18.0 (B)	26.6 (C)*	16.7 (B)	23.6 (C)*	18.9 (B)	23.4 (C)*	18.6 (B)	24.1 (C)*	21.3 (C)	24.7 (C)*	14.6 (B)
	SC 9/SC 31 NB Off Ramp[3]	NA	NA	18.4 (B)*	12.3 (B)	17.9 (B)*	13.1 (B)	18.8 (B)*	11.3 (B)	18.1 (B)*	15.3 (B)	17.8 (B)*	14.7 (B)	14.9 (B)*	17.5 (B)	18.4 (B)*	14.9 (B)
3	SC 9/Food Lion Dr/Sea Mountain Hwy	**127.9 (F)**	**148.9 (F)**	28.0 (C)*	24.7 (C)**	31.6 (C)**	24.5 (C)**	23.0 (C)**	23.5 (C)**	21.7 (C)**	22.9 (C)**	23.0 (C)**	23.3 (C)**	25.2 (C)**	23.8 (C)**	26.0 (C)**	22.3 (C)**
4	SC 9 SB Off Ramp/SC 90	**102.4 (F)**	**57.0 (E)****	23.5 (C)**	2.3 (A)*	19.2 (B)	4.3 (A)*	21.2 (C)*	6.9 (A)*	23.0 (C)*	0.0 (A)	18.2 (B)*	4.0 (A)*	19.4 (B)*	5.7 (A)**	0.3 (A)**	5.3 (A)*
5	US 17/SC 9 NB Off Ramp/SC 90[3]	NA	NA	12.5 (B)	21.0 (C)*	14.3 (B)**	16.7 (B)	16.1 (B)*	15.4 (B)	15.5 (B)**	22.1 (C)*	14.9 (B)*	16.8 (B)*	17.1 (B)**	27.0 (C)*	15.0 (B)*	23.9 (C)*
6	US 17/SC 90/Fairway Dr	29.4 (C)**	**51.1 (D)****	22.3 (C)*	26.1 (C)*	25.0 (C)**	24.4 (C)**	25.1 (C)*	22.8 (C)*	28.2 (C)*	**37.0 (D)****	23.6 (C)**	24.3 (C)**	25.2 (C)*	28.4 (C)**	26.7 (C)*	23.7 (C)*
7	US 17/River Hills Dr/ Coquina Harbor Dr	23.2 (C)**	21.8 (C)**	21.6 (C)*	17.0 (B)**	21.0 (C)*	19.5 (B)**	19.8 (B)*	15.3 (B)**	26.2 (C)*	26.8 (C)**	20.0 (C)**	15.9 (B)*	25.6 (C)*	15.3 (B)**	20.8 (C)*	12.8 (B)**
8	US 17/Horseshoe Rd/ Baker St	31.8 (C)**	23.8 (C)**	16.8 (B)**	18.9 (B)**	18.8 (B)*	19.4 (B)**	16.2 (B)*	13.9 (B)**	12.9 (B)*	22.3 (C)**	16.5 (B)**	21.4 (C)**	19.8 (B)*	13.5 (B)*	13.9 (B)*	16.4 (B)**
9	US 17/Pinehurst Circle	9.6 (A)**	8.4 (A)**	10.7 (B)**	9.8 (A)**	10.5 (B)**	8.1 (A)**	10.3 (B)**	8.0 (A)**	10.6 (B)**	14.9 (B)**	10.8 (B)**	7.9 (A)**	12.1 (B)**	12.0 (B)*	10.0 (B)*	7.4 (A)**
10	US 17/S-50 (Mineola Ave)	24.1 (C)**	26.7 (C)**	25.2 (C)**	**35.2 (D)****	30.8 (C)**	34.8 (C)**	27.0 (C)**	24.4 (C)*	**42.1 (D)****	34.8 (C)**	**56.0 (E)****	34.9 (C)*	34.5 (C)**	33.0 (C)*	24.0 (C)**	20.5 (C)*
11	US 17 SB/Heather Glen Way[3]	NA	NA	11.5 (B)*	18.3 (B)*	17.7 (B)	15.4 (B)	11.7 (B)	9.1 (A)	10.6 (B)	9.5 (A)**	11.0 (B)	14.4 (B)	14.0 (B)	15.7 (B)	14.7 (B)	11.9 (B)
	US 17 NB/Heather Glen Way[3]	NA	NA	8.6 (A)	17.0 (B)*	9.4 (A)	14.7 (B)	10.8 (B)	14.9 (B)	12.9 (B)	17.5 (B)*	9.4 (A)	14.0 (B)*	8.8 (A)*	15.9 (B)	8.7 (A)	16.0 (B)
14	US 17/Heather Lakes Dr/Pavilion Dr[3]	NA	NA	22.8 (C)**	21.0 (C)*	20.6 (C)**	20.1 (C)*	13.8 (B)*	19.1 (B)*	19.0 (B)**	26.9 (C)**	25.2 (C)**	20.5 (C)*	20.5 (C)**	14.7 (B)*	12.9 (B)**	17.1 (B)*
20	US 17/Graystone Blvd/ SC 179	23.7 (C)**	33.2 (C)**	19.1 (B)**	30.9 (C)**	23.3 (C)**	23.1 (C)**	21.4 (C)*	26.2 (C)**	17.3 (B)**	34.1 (C)**	21.0 (C)**	23.8 (C)**	22.5 (C)**	21.4 (C)**	**35.5 (D)***	21.8 (C)**
21	S-57 (Wampee Rd)/ S-111 (Little River Rd)[4]	NA	NA	16.0 (B)	14.2 (B)*	16.3 (B)	14.1 (B)	13.5 (B)	9.0 (A)	NA	NA	NA	NA	NA	NA	NA	NA

Table 2-7. 2045 AADT Signalized Intersection Level of Service for No-Build and Detailed Study Alternatives (continued)

Int. No.[1]	Intersection Name	No Build		Alternative 1		Alternative 1A		Alternative 2		Alternative 4		Alternative 4A		Alternative 7		Alternative 8	
		Delay in Seconds (LOS)[2]															
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
36	SC 90/Sea Mountain Highway	**112.1 (F)**	**83.9 (F)**	**48.8 (D)****	**60.6 (E)****	**54.3 (D)****	**60.2 (E)****	**53.5 (D)****	**35.4 (D)***	**39.2 (D)****	**49.0 (D)****	**52.1 (D)****	**53.1 (D)****	**47.3 (D)****	**53.6 (D)****	**57.7 (E)****	**77.2 (E)****
North Carolina																	
12	US 17 NB/NC 904 NB[5]	24.8 (C)	29.6 (C)	NA	NA	24.9 (C)	27.0 (C)	NA	NA	NA	NA	21.6 (C)	30.8 (C)	NA	NA	NA	NA
	US 17 SB/NC 904 SB[5]	22.4 (C)	15.5 (B)	NA	NA	26.6 (C)	16.3 (B)	NA	NA	NA	NA	27.3 (C)	16.4 (B)	NA	NA	NA	NA
15	US 17/SR 1300 (Calabash Rd)/SR 1168 (Country Club Dr)	**46.0 (D)****	**52.1 (D)****	**38.1 (D)***	**40.6 (D)****	**37.3 (D)***	**37.9 (D)***	33.1 (C)*	**37.7 (D)****	32.4 (C)*	**47.1 (D)****	**40.6 (D)***	**39.0 (D)***	**39.7 (D)***	**36.0 (D)***	NA	NA
17	US 17 SB/Hickman Rd[3,6]	NA	NA	13.8 (B)**	20.1 (C)*	27.5 (C)*	**35.0 (D)**	NA	NA	12.7 (B)*	27.3 (C)**	30.5 (C)*	34.7 (C)*	NA	NA	NA	NA
	US 17 NB/Hickman Rd[3,6]	NA	NA	1.0 (A)	3.5 (A)	3.1 (A)	4.2 (A)	NA	NA	1.3 (A)	4.6 (A)	2.8 (A)	4.4 (A)	NA	NA	NA	NA
19	US 17/SR 1304 (Pea Landing Rd)/SR 1165 (Thomasboro Rd)[7]	22.4 (C)**	29.2 (C)**	27.3 (C)*	33.9 (C)*	18.9 (B)	24.1 (C)*	NA	NA	25.5 (C)*	**42.6 (D)****	18.8 (B)*	23.9 (C)*	NA	NA	NA	NA
31	US 17/SR 1319 (Union School Rd)	1.9 (A)**	2.2 (A)**	NA	NA	1.4 (A)**	0.9 (A)**	NA	NA	NA	NA	0.4 (A)**	0.9 (A)**	NA	NA	NA	NA
32	US 17/SR 1184 (Ocean Isle Beach Rd)[3]	NA	NA	NA	NA	24.1 (C)	24.2 (C)	NA	NA	NA	NA	24.6 (C)	23.7 (C)	NA	NA	NA	NA
33	US 17 Bus WB/US 17 NB[8]	23.1 (C)	28.7 (C)	NA	NA	22.5 (C)	26.2 (C)	NA	NA	NA	NA	22.8 (C)	27.4 (C)	NA	NA	NA	NA
	Old Shallotte Rd/US 17 SB[8]	20.5 (C)	11.9 (B)	NA	NA	13.6 (B)*	11.6 (B)*	NA	NA	NA	NA	16.5 (B)	9.7 (A)*	NA	NA	NA	NA
34	US 17 SB Loop/NC 130[9]	18.4 (B)*	32.7 (C)*	17.0 (B)*	15.8 (B)*	19.3 (B)	22.9 (C)	14.4 (B)	14.9 (B)*	14.4 (B)	19.6 (B)**	16.1 (B)	22.2 (C)	14.5 (B)	15.0 (B)*	17.3 (B)*	15.0 (B)*
35	US 17 NB Loop/NC 130/Visitor Center[9]	12.3 (B)*	8.3 (A)**	10.3 (B)*	7.9 (A)*	13.2 (B)*	13.6 (B)*	11.2 (B)	9.2 (A)*	10.8 (B)	8.5 (A)*	12.3 (B)	12.9 (B)*	11.6 (B)	8.5 (A)	10.9 (B)*	8.9 (A)
141	US 17 SB U-turn west of US 17/NC 904[5]	19.8 (B)	27.6 (C)*	NA	NA	26.7 (C)*	22.7 (C)*	NA	NA	NA	NA	22.0 (C)	25.6 (C)*	NA	NA	NA	NA
143	US 17 NB U-turn east of US 17/NC 904[5]	18.5 (B)*	17.1 (B)*	NA	NA	19.7 (B)	21.1 (C)	NA	NA	NA	NA	19.2 (B)	23.6 (C)	NA	NA	NA	NA

Table 2-7. 2045 AADT Signalized Intersection Level of Service for No-Build and Detailed Study Alternatives (continued)

Int. No.[1]	Intersection Name	No Build		Alternative 1		Alternative 1A		Alternative 2		Alternative 4		Alternative 4A		Alternative 7		Alternative 8	
		Delay in Seconds (LOS)[2]															
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
144	US 17 NB U-turn north of US 17/Old Shallotte Rd/US 17 Bus (Main St)[8]	23.8 (C)*	21.9 (C)*	NA	NA	14.2 (B)	15.1 (B)	NA	NA	NA	NA	25.5 (C)	17.4 (B)	NA	NA	NA	NA
145	US 17 SB U-turn south of US 17/Old Shallotte Rd/US 17 Bus (Main St)[8]	21.4 (C)*	25.6 (C)*	NA	NA	15.7 (B)	11.2 (B)	NA	NA	NA	NA	18.2 (B)*	10.1 (B)	NA	NA	NA	NA

[1]Intersection numbers are shown on Figures 6 through 9.
[2]Overall LOS is presented for signalized intersections. Asterisks denote one or more approaches during one of the peak hours are LOS E (*) or LOS F (**). Shading is used to highlight signalized intersections identified in the table as operating at an overall LOS D (blue shading), LOS E (orange shading), or LOS F (red shading).
[3]Intersection is currently unsignalized; however, a traffic signal was included in the 2045 AADT and ASWT LOS analyses for the Detailed Study Alternatives.
[4]Although the S-57 (Wampee Road)/S-111 (Little River Road) intersection was analyzed as unsignalized in the No-Build and Build Conditions traffic capacity analyses conducted in 2018 and 2019, a traffic signal was installed at the intersection in late 2022 as part of SCDOT STIP Project P038944.
[5]Intersection is analyzed as part of the future Synchronized Street at the US 17/NC 904 intersection (NCDOT STIP Project R-5851).
[6]The US 17/Hickman Road intersection was recently converted to a Synchronized Street as part of NCDOT STIP Project W-5703H; however, a standard signalized intersection design was used for the traffic capacity analyses conducted in 2018 and 2019 for the Detailed Study Alternatives.
[7]The US 17/SR 1304 (Pea Landing Road)/SR 1165 (Thomasboro Road) intersection was recently converted to a Synchronized Street as part of NCDOT STIP Project W-5601GA; however, the previous signalized intersection configuration was used for the traffic capacity analyses conducted in 2018 and 2019 for the No-Build Conditions, as well as the analyses for the Detailed Study Alternatives.
[8]Intersection is analyzed as part of the future Synchronized Street at the US 17/US 17 Business (Main Street)/Old Shallotte Road intersection (NCDOT STIP Project R-5857).
[9]Both US 17 ramp/NC 130 intersections are currently unsignalized; however, due to the extent of congestion observed in the initial 2045 No-Build analysis simulations, traffic signals at both intersections were included in the 2045 AADT and ASWT LOS analyses for the No-Build Alternative and the Detailed Study Alternatives. Although no specific project has been identified at this time to provide these improvements, it is reasonable to assume they could be in place by the 2045 design year.

Table 2-8. 2045 ASWT Signalized Intersection Level of Service for No-Build and Detailed Study Alternatives

Int. No.[1]	Intersection Name	No Build		Alternative 1		Alternative 1A		Alternative 2		Alternative 4		Alternative 4A		Alternative 7		Alternative 8	
		Delay in Seconds (LOS)[2]															
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
South Carolina																	
1	SC 9/S-57 (Wampee Rd)	**173.4 (F)**	**177.6 (F)**	**73.6 (E)****	34.5 (C)*	**74.5 (E)****	**37.1 (D)****	**67.0 (E)****	32.0 (C)*	**59.2 (E)****	31.5 (C)**	**55.7 (E)****	31.0 (C)**	**63.2 (E)****	28.9 (C)**	**81.4 (F)**	32.2 (C)**
2	SC 9/SC 31 SB Off Ramp[3]	NA	NA	22.0 (C)*	17.6 (B)*	21.6 (C)*	31.8 (C)	19.7 (B)*	23.0 (C)*	14.8 (B)*	23.5 (C)*	15.6 (B)*	31.7 (C)*	21.3 (C)*	**35.6 (D)***	16.8 (B)*	17.9 (B)*
	SC 9/SC 31 NB Off Ramp[3]	NA	NA	21.5 (C)*	29.9 (C)	18.9 (B)*	29.3 (C)	20.5 (C)*	33.7 (C)	20.0 (B)*	32.2 (C)	19.0 (B)*	33.9 (C)	18.4 (B)*	**47.0 (D)***	19.6 (B)*	30.1 (C)
3	SC 9/Food Lion Dr/Sea Mountain Hwy	**110.8 (F)**	**239.8 (F)**	27.3 (C)**	29.3 (C)**	26.4 (C)**	33.3 (C)**	30.3 (C)**	30.6 (C)**	28.5 (C)**	29.1 (C)**	29.2 (C)**	29.9 (C)**	29.2 (C)**	28.3 (C)**	25.6 (C)**	34.0 (C)**
4	SC 9 SB Off Ramp/SC 90	**128.1 (F)**	**56.8 (E)****	19.0 (B)	**36.1 (D)****	21.3 (C)*	29.9 (C)**	34.0 (C)*	1.1 (A)**	**35.9 (D)****	31.1 (C)**	19.0 (B)*	3.5 (A)**	9.1 (A)*	**87.4 (F)**	5.8 (A)*	**70.9 (E)****
5	US 17/SC 9 NB Off Ramp/SC 90[3]	NA	NA	19.0 (B)*	**56.3 (E)****	14.7 (B)**	18.9 (B)	22.5 (C)*	24.9 (C)**	15.0 (B)*	**54.1 (D)****	19.5 (B)*	24.6 (C)*	20.4 (C)*	**121.0 (F)**	19.9 (B)	**116.2 (F)**
6	US 17/SC 90/Fairway Dr	**74.6 (E)****	**61.9 (E)****	25.8 (C)**	29.5 (C)**	27.8 (C)*	31.0 (C)*	24.1 (C)*	26.5 (C)**	29.8 (C)**	30.9 (C)**	24.6 (C)*	26.6 (C)*	24.8 (C)*	**41.9 (D)****	32.9 (C)**	**43.4 (D)****
7	US 17/River Hills Dr/ Coquina Harbor Dr	**72.9 (E)****	34.8 (C)**	32.5 (C)**	17.9 (B)**	32.9 (C)**	28.8 (C)**	**45.5 (D)****	17.5 (B)**	27.4 (C)*	20.0 (B)**	23.8 (C)**	21.4 (C)**	23.5 (C)*	21.3 (C)**	32.7 (C)**	16.3 (B)**
8	US 17/Horseshoe Rd/ Baker St	**55.9 (E)****	**61.8 (E)****	14.3 (B)**	24.6 (C)*	27.0 (C)**	29.9 (C)**	17.7 (B)*	20.9 (C)**	21.9 (C)**	29.4 (C)**	14.4 (B)*	24.0 (C)*	17.8 (B)*	30.2 (C)**	18.2 (B)**	25.3 (C)*
9	US 17/Pinehurst Circle	18.0 (B)**	**59.4 (E)****	14.2 (B)**	11.1 (B)**	16.3 (B)**	10.8 (B)**	12.4 (B)**	8.6 (A)**	11.2 (B)**	7.5 (A)**	10.4 (B)**	10.7 (B)**	11.4 (B)**	9.6 (A)**	11.9 (B)**	8.5 (A)**
10	US 17/S-50 (Mineola Ave)	22.3 (C)**	**48.6 (D)****	27.2 (C)**	28.9 (C)*	**41.0 (D)****	**47.4 (D)****	26.9 (C)*	29.9 (C)**	26.3 (C)*	29.8 (C)**	31.0 (C)**	21.2 (C)*	27.7 (C)**	24.7 (C)*	**35.8 (D)****	28.4 (C)**
11	US 17 SB/Heather Glen Way[3]	NA	NA	13.1 (B)*	17.6 (B)	15.6 (B)	14.6 (B)*	20.5 (C)	15.8 (B)	12.2 (B)	14.5 (B)	17.0 (B)*	16.7 (B)	27.1 (C)	21.9 (C)	21.1 (C)*	16.6 (B)
	US 17 NB/Heather Glen Way[3]	NA	NA	11.2 (B)**	14.6 (B)	10.6 (B)**	13.3 (B)*	8.7 (A)*	13.8 (B)*	10.4 (B)	11.4 (B)	9.1 (A)**	11.9 (B)	8.2 (A)*	15.5 (B)*	9.9 (A)**	13.1 (B)
14	US 17/Heather Lakes Dr/Pavilion Dr[3]	NA	NA	30.3 (C)**	19.1 (B)*	19.4 (B)**	21.4 (C)**	18.0 (B)*	20.0 (B)**	20.6 (C)*	15.9 (B)**	22.9 (C)*	24.8 (C)**	24.4 (C)	29.0 (C)**	25.5 (C)**	16.7 (B)**
20	US 17/Graystone Blvd/ SC 179	**46.2 (D)****	**68.6 (E)****	29.2 (C)**	25.9 (C)**	25.7 (C)**	30.0 (C)**	31.2 (C)**	31.5 (C)**	22.9 (C)**	**35.9 (D)****	27.9 (C)**	31.7 (C)**	26.9 (C)*	26.7 (C)**	34.6 (C)**	27.5 (C)*
21	S-57 (Wampee Rd)/ S-111 (Little River Rd)[4]	NA	NA	21.5 (C)*	16.3 (B)	17.3 (B)*	22.6 (C)*	13.4 (B)	9.9 (A)	NA	NA	NA	NA	NA	NA	NA	NA

Table 2-8. 2045 ASWT Signalized Intersection Level of Service for No-Build and Detailed Study Alternatives (continued)

Int. No.[1]	Intersection Name	No Build		Alternative 1		Alternative 1A		Alternative 2		Alternative 4		Alternative 4A		Alternative 7		Alternative 8	
		Delay in Seconds (LOS)[2]															
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
36	SC 90/Sea Mountain Highway	**175.8 (F)**	**96.6 (F)**	**52.0 (D)****	**117.3 (F)**	**62.9 (E)****	**79.5 (E)****	**50.4 (D)****	**122.4 (F)**	**53.5 (D)****	**92.8 (F)**	**46.4 (D)****	**115.4 (F)**	**71.2 (E)****	**100.0 (F)**	**49.1 (D)****	**96.9 (F)**
North Carolina																	
12	US 17 NB/NC 904 NB[5]	34.7 (C)	30.7 (C)	NA	NA	21.4 (C)	**37.6 (D)***	NA	NA	NA	NA	18.8 (B)	**53.7 (D)****	NA	NA	NA	NA
	US 17 SB/NC 904 SB[5]	26.9 (C)**	16.4 (B)*	NA	NA	17.7 (B)	17.6 (B)*	NA	NA	NA	NA	18.0 (B)	21.6 (C)*	NA	NA	NA	NA
15	US 17/SR 1300 (Calabash Rd)/SR 1168 (Country Club Dr)	**157.4 (F)**	**159.8 (F)**	**46.0 (D)***	**36.3 (D)***	32.4 (C)*	**40.8 (D)***	32.0 (C)*	34.8 (C)*	**40.1 (D)***	34.0 (C)*	**39.2 (D)****	**39.3 (D)***	**35.8 (D)***	**41.3 (D)****	NA	NA
17	US 17 SB/Hickman Rd[3,6]	NA	NA	13.2 (B)**	17.7 (B)*	16.7 (B)*	35.0 (C)*	NA	NA	12.9 (B)**	27.3 (C)*	21.9 (C)**	27.2 (C)	NA	NA	NA	NA
	US 17 NB/Hickman Rd[3,6]	NA	NA	1.8 (A)	5.8 (A)	3.0 (A)	6.1 (A)	NA	NA	1.6 (A)	4.3 (A)	1.8 (A)	4.5 (A)	NA	NA	NA	NA
19	US 17/SR 1304 (Pea Landing Rd)/SR 1165 (Thomasboro Rd)[7]	26.4 (C)**	**41.2 (D)****	27.5 (C)**	24.9 (C)*	20.6 (C)*	30.6 (C)**	NA	NA	25.4 (C)**	29.5 (C)**	28.5 (C)**	27.4 (C)*	NA	NA	NA	NA
31	US 17/SR 1319 (Union School Rd)	3.0 (A)**	1.5 (A)**	NA	NA	3.3 (A)**	1.2 (A)**	NA	NA	NA	NA	0.8 (A)**	1.4 (A)**	NA	NA	NA	NA
32	US 17/SR 1184 (Ocean Isle Beach Rd)[3]	NA	NA	NA	NA	24.6 (C)	28.7 (C)	NA	NA	NA	NA	**36.0 (D)**	32.3 (C)	NA	NA	NA	NA
33	US 17 Bus WB/US 17 NB[8]	27.7 (C)	29.5 (C)	NA	NA	**37.0 (D)****	26.4 (C)	NA	NA	NA	NA	33.8 (C)	33.6 (C)	NA	NA	NA	NA
	Old Shallotte Rd/US 17 SB[8]	19.8 (B)	13.4 (B)	NA	NA	16.5 (B)*	11.5 (B)	NA	NA	NA	NA	22.6 (C)*	9.4 (A)*	NA	NA	NA	NA
34	US 17 SB Loop/NC 130[9]	22.5 (C)*	**71.5 (E)****	15.8 (B)	17.1 (B)	17.3 (B)	22.2 (C)	15.6 (B)	22.4 (C)**	15.2 (B)	23.8 (C)*	16.8 (B)	**35.6 (D)****	15.6 (B)	18.3 (B)*	15.4 (B)	16.9 (B)*
35	US 17 NB Loop/NC 130/Visitor Center[9]	15.2 (B)*	17.4 (B)**	12.9 (B)	12.0 (B)	13.8 (B)*	11.9 (B)	13.3 (B)	12.0 (B)*	12.3 (B)	11.6 (B)*	13.3 (B)	12.6 (B)*	12.0 (B)	11.3 (B)	12.9 (B)	11.8 (B)
141	US 17 SB U-turn west of US 17/NC 904[5]	13.8 (B)	12.8 (B)	NA	NA	33.6 (C)*	13.2 (B)	NA	NA	NA	NA	21.3 (C)	22.6 (C)*	NA	NA	NA	NA
143	US 17 NB U-turn east of US 17/NC 904[5]	24.1 (C)**	17.9 (B)	NA	NA	14.6 (B)	**35.8 (D)***	NA	NA	NA	NA	**36.1 (D)***	**41.8 (D)***	NA	NA	NA	NA

Table 2-8. 2045 ASWT Signalized Intersection Level of Service for No-Build and Detailed Study Alternatives (continued)

Int. No.[1]	Intersection Name	No Build		Alternative 1		Alternative 1A		Alternative 2		Alternative 4		Alternative 4A		Alternative 7		Alternative 8	
		Delay in Seconds (LOS)[2]															
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
144	US 17 NB U-turn north of US 17/Old Shallotte Rd/US 17 Bus (Main St)[8]	23.0 (C)*	17.2 (B)*	NA	NA	15.1 (B)	30.7 (C)*	NA	NA	NA	NA	19.7 (B)	**38.6 (D)***	NA	NA	NA	NA
145	US 17 SB U-turn south of US 17/Old Shallotte Rd/US 17 Bus (Main St)[8]	20.0 (C)	31.5 (C)*	NA	NA	13.6 (B)	12.1 (B)	NA	NA	NA	NA	15.3 (B)	11.2 (B)	NA	NA	NA	NA

[1]Intersection numbers are shown on Figures 6 through 9.
[2]Overall LOS is presented for signalized intersections. Asterisks denote one or more approaches during one of the peak hours are LOS E (*) or LOS F (**). Shading is used to highlight signalized intersections identified in the table as operating at an overall LOS D (blue shading), LOS E (orange shading), or LOS F (red shading).
[3]Intersection is currently unsignalized; however, a traffic signal was included in the 2045 AADT and ASWT LOS analyses for the Detailed Study Alternatives.
[4]Although the S-57 (Wampee Road)/S-111 (Little River Road) intersection was analyzed as unsignalized in the No-Build and Build Conditions traffic capacity analyses conducted in 2018 and 2019, a traffic signal was installed at the intersection in late 2022 as part of SCDOT STIP Project P038944.
[5]Intersection is analyzed as part of the future Synchronized Street at the US 17/NC 904 intersection (NCDOT STIP Project R-5851).
[6]The US 17/Hickman Road intersection was recently converted to a Synchronized Street as part of NCDOT STIP Project W-5703H; however, a standard signalized intersection design was used for the traffic capacity analyses conducted in 2018 and 2019 for the Detailed Study Alternatives.
[7]The US 17/SR 1304 (Pea Landing Road)/SR 1165 (Thomasboro Road) intersection was recently converted to a Synchronized Street as part of NCDOT STIP Project W-5601GA; however, the previous signalized intersection configuration was used for the traffic capacity analyses conducted in 2018 and 2019 for the No-Build Conditions, as well as the analyses for the Detailed Study Alternatives.
[8]Intersection is analyzed as part of the future Synchronized Street at the US 17/US 17 Business (Main Street)/Old Shallotte Road intersection (NCDOT STIP Project R-5857).
[9]Both US 17 ramp/NC 130 intersections are currently unsignalized; however, due to the extent of congestion observed in the initial 2045 No-Build analysis simulations, traffic signals at both intersections were included in the 2045 AADT and ASWT LOS analyses for the No-Build Alternative and the Detailed Study Alternatives. Although no specific project has been identified at this time to provide these improvements, it is reasonable to assume they could be in place by the 2045 design year.

Figures 17A through 17N show the anticipated 2045 AADT LOS for signalized, unsignalized, and proposed roundabout intersections with the seven Detailed Study Alternatives for both the AM and PM peak hours. Figures 18A through 18N show the same information for 2045 ASWT conditions. For the Detailed Study Alternatives under 2045 AADT conditions, only Alternative 8 has an intersection within the project construction limits with a movement anticipated to operate at an unacceptable LOS. The US 17 northbound off-ramp approach at the proposed roundabout at the US 17/Calabash Road/Country Club Road interchange is forecast to operate at LOS E in the PM peak hour (see Figure 17N). For the Detailed Study Alternatives under 2045 ASWT conditions, Alternative 4A has one intersection and Alternative 7 has three intersections within the project construction limits with movements anticipated to operate at an unacceptable LOS. For Alternative 4A, the northbound off-ramp approach at the proposed roundabout at the NC 904 interchange is forecast to operate at LOS E in the AM peak hour (see Figure 18I). For Alternative 7, the northbound and the southbound Carolina Bays Parkway off-ramp signalized intersections at SC 9 are both forecast to operate at LOS D in the PM peak hour (see Figure 18L). In addition, the northbound off-ramp approach at the proposed roundabout at the NC 904 interchange is forecast to operate at LOS E in the AM peak hour (see Figure 18K).

As shown on Figures 17A through 17N (2045 AADT conditions LOS) and Figures 18A through 18N (2045 ASWT conditions LOS), the freeway capacity analysis for the seven Detailed Study Alternatives indicates that all of the freeway segments composing the alternatives are anticipated to operate at LOS C or better under all future year 2045 conditions. These figures also indicate that some of the existing freeway segments analyzed in South Carolina in the vicinity of the US 17/SC 9 interchange will continue to operate at an unacceptable LOS (LOS D or worse) under some future year 2045 conditions with all of the Detailed Study Alternatives; however, travelers will experience improved driving conditions in these areas as the volume of traffic and associated congestion and delays would be reduced as a result of traffic diverted to the proposed project.

2.8.1.3 Year 2045 Travel Time Analysis

The December 2022 traffic technical report also documents the 2045 travel times analysis for the seven Detailed Study Alternatives and the No-Build Alternative. The estimated amount of time it would take to travel between the project termini in 2045 for each of the seven Detailed Study Alternatives and the No-Build Alternative was determined using TransModeler based on the updated 2045 traffic forecasts. As discussed in Section 1.3.3.4, the No-Build Alternative travel times analysis is based on two existing routes within the study area (see Exhibit A in Chapter 1). The North Route follows US 17 from NC 130 (Whiteville Road) to Hickman Road, continues along Hickman Road/Wampee Road to SC 9, and then turns onto SC 9 before ending at SC 31. The South Route follows US 17 from NC 130 to SC 9, then turns onto SC 9 before ending at SC 31.

Table 2-9 through Table 2-12 provide a summary of the 2045 travel time analysis for the seven Detailed Study Alternatives and the No-Build Alternative for AADT and ASWT conditions, for both the AM and PM peak hours.

The travel time analysis results show that all Detailed Study Alternatives are expected to provide a substantially shorter travel time between the project termini for all of the future conditions analyzed than the No-Build Alternative routes, which is reasonable due to the fact that the Carolina Bays Parkway is proposed to be a high-speed, access-controlled freeway facility compared to the other two-lane highway and signalized arterial route choices. The least amount of travel time savings for any of the Detailed Study Alternatives is approximately eight minutes for Alternatives 1, 1A, 4, and 4A (i.e., the

Table 2-9. 2045 AADT (AM Peak) Travel Time Summary for No-Build and Detailed Study Alternatives

Detailed Study Alternatives	Type	Northbound			Southbound		
		South Route	North Route	CBP Extension	South Route	North Route	CBP Extension
No-Build	Length (miles)	19.6	19.1	N/A	19.7	18.8	N/A
	Travel Time (minutes)	28	29	N/A	30	27	N/A
	Speed (MPH)	42	40	N/A	40	42	N/A
Alternative 1	Length (miles)	19.6	19.2	20.6	19.5	18.8	20.6
	Travel Time (minutes)	24	21	18	23	20	18
	Speed (MPH)	48	54	68	51	55	70
Alternative 1A	Length (miles)	19.5	19.1	20.0	19.5	18.5	20.1
	Travel Time (minutes)	26	24	18	25	22	17
	Speed (MPH)	45	48	67	47	50	70
Alternative 2	Length (miles)	19.6	19.4	18.8	19.7	19.5	18.8
	Travel Time (minutes)	23	20	16	23	21	16
	Speed (MPH)	51	58	69	53	57	70
Alternative 4	Length (miles)	19.6	19.2	20.5	19.5	18.9	20.5
	Travel Time (minutes)	25	21	18	24	21	18
	Speed (MPH)	47	55	69	50	55	70
Alternative 4A	Length (miles)	19.5	19.1	19.9	19.6	19.0	20.0
	Travel Time (minutes)	27	23	18	25	23	17
	Speed (MPH)	44	49	67	48	50	70
Alternative 7	Length (miles)	19.3	19.6	17.9	19.8	19.6	18.1
	Travel Time (minutes)	23	20	15	23	21	16
	Speed (MPH)	50	58	69	51	57	69
Alternative 8	Length (miles)	19.5	19.8	18.4	19.3	19.1	18.4
	Travel Time (minutes)	22	21	16	22	20	16
	Speed (MPH)	52	56	69	54	57	70

longer alternatives) in comparison to the North Route (northbound) under 2045 AADT (PM peak) conditions, as well as for Alternatives 1 and 4 in comparison to the North Route (southbound) under 2045 AADT (PM peak) conditions, which represents a 44 percent decrease in travel time compared to the No-Build condition. The greatest amount of travel times savings is approximately 22 minutes for Alternatives 2, 7, and 8 (i.e., the shorter alternatives) in comparison to the South Route (northbound) under 2045 ASWT (AM peak) conditions, representing a 137 percent reduction in travel time compared to the No-Build condition. With the completion of the proposed project using any of the Detailed Study Alternatives, the existing routes analyzed are also expected to operate substantially quicker for motorists

Table 2-10. 2045 AADT (PM Peak) Travel Time Summary for No-Build and Detailed Study Alternatives

Detailed Study Alternatives	Type	Northbound			Southbound		
		South Route	North Route	CBP Extension	South Route	North Route	CBP Extension
No-Build	Length (miles)	19.6	19.1	N/A	19.7	18.8	N/A
	Travel Time (minutes)	28	26	N/A	28	26	N/A
	Speed (MPH)	42	44	N/A	42	44	N/A
Alternative 1	Length (miles)	19.6	19.2	20.6	19.5	18.8	20.6
	Travel Time (minutes)	24	21	18	24	21	18
	Speed (MPH)	49	54	67	49	55	69
Alternative 1A	Length (miles)	19.5	19.1	20.0	19.5	18.5	20.1
	Travel Time (minutes)	27	24	18	26	22	17
	Speed (MPH)	43	48	67	45	50	70
Alternative 2	Length (miles)	19.6	19.4	18.8	19.7	19.5	18.8
	Travel Time (minutes)	23	20	16	23	20	16
	Speed (MPH)	51	58	69	52	58	69
Alternative 4	Length (miles)	19.6	19.2	20.5	19.5	18.9	20.5
	Travel Time (minutes)	23	21	18	25	20	18
	Speed (MPH)	52	55	69	47	56	69
Alternative 4A	Length (miles)	19.5	19.1	19.9	19.6	19.0	20.0
	Travel Time (minutes)	27	23	18	26	22	17
	Speed (MPH)	43	49	67	45	51	69
Alternative 7	Length (miles)	19.3	19.6	17.9	19.8	19.6	18.1
	Travel Time (minutes)	23	20	16	23	20	16
	Speed (MPH)	50	58	69	52	59	69
Alternative 8	Length (miles)	19.5	19.8	18.4	19.3	19.1	18.4
	Travel Time (minutes)	22	21	16	21	20	16
	Speed (MPH)	53	56	69	54	57	69

under all future conditions as substantial traffic volumes are shifted from these routes to the Carolina Bays Parkway Extension. While all Detailed Study Alternatives are expected to perform similarly in terms of travel time savings, Alternatives 2, 7, and 8 (i.e., the shorter alternatives) are expected to provide slightly reduced travel times in comparison to the other Detailed Study Alternatives. The posted speed limit on the Carolina Bays Parkway Extension is proposed to be 70 mph, and all of the Detailed Study Alternatives are expected to operate at speeds between 67 mph and 70 mph under all 2045 conditions analyzed.

Table 2-11. 2045 ASWT (AM Peak) Travel Time Summary for No-Build and Detailed Study Alternatives

Detailed Study Alternatives	Type	Northbound			Southbound		
		South Route	North Route	CBP Extension	South Route	North Route	CBP Extension
No-Build	Length (miles)	19.6	19.1	N/A	19.7	18.8	N/A
	Travel Time (minutes)	38	29	N/A	28	31	N/A
	Speed (MPH)	31	40	N/A	42	36	N/A
Alternative 1	Length (miles)	19.6	19.2	20.6	19.5	18.8	20.6
	Travel Time (minutes)	25	21	18	24	21	18
	Speed (MPH)	47	55	67	49	54	70
Alternative 1A	Length (miles)	19.5	19.1	20.0	19.5	18.5	20.1
	Travel Time (minutes)	27	24	18	26	23	17
	Speed (MPH)	44	47	67	46	48	70
Alternative 2	Length (miles)	19.6	19.4	18.8	19.7	19.5	18.8
	Travel Time (minutes)	24	20	16	23	23	16
	Speed (MPH)	49	58	69	52	50	69
Alternative 4	Length (miles)	19.6	19.2	20.5	19.5	18.9	20.5
	Travel Time (minutes)	25	21	18	24	21	18
	Speed (MPH)	47	55	69	50	53	70
Alternative 4A	Length (miles)	19.5	19.1	19.9	19.6	19.0	20.0
	Travel Time (minutes)	27	23	18	25	24	17
	Speed (MPH)	44	50	67	46	48	70
Alternative 7	Length (miles)	19.3	19.6	17.9	19.8	19.6	18.1
	Travel Time (minutes)	23	20	16	23	21	16
	Speed (MPH)	50	57	69	51	56	69
Alternative 8	Length (miles)	19.5	19.8	18.4	19.3	19.1	18.4
	Travel Time (minutes)	23	21	16	22	27	16
	Speed (MPH)	50	56	69	52	43	70

Table 2-12. 2045 ASWT (PM Peak) Travel Time Summary for No-Build and Detailed Study Alternatives

Detailed Study Alternatives	Type	Northbound			Southbound		
		South Route	North Route	CBP Extension	South Route	North Route	CBP Extension
No-Build	Length (miles)	19.6	19.1	N/A	19.7	18.8	N/A
	Travel Time (minutes)	34	28	N/A	35	30	N/A
	Speed (MPH)	35	41	N/A	33	38	N/A
Alternative 1	Length (miles)	19.6	19.2	20.6	19.5	18.8	20.6
	Travel Time (minutes)	24	21	18	24	21	18
	Speed (MPH)	49	54	67	49	55	69
Alternative 1A	Length (miles)	19.5	19.1	20.0	19.5	18.5	20.1
	Travel Time (minutes)	28	25	18	26	22	18
	Speed (MPH)	41	46	68	44	50	69
Alternative 2	Length (miles)	19.6	19.4	18.8	19.7	19.5	18.8
	Travel Time (minutes)	23	20	16	24	21	16
	Speed (MPH)	50	59	69	50	57	69
Alternative 4	Length (miles)	19.6	19.2	20.5	19.5	18.9	20.5
	Travel Time (minutes)	26	21	18	24	21	18
	Speed (MPH)	46	54	70	48	55	69
Alternative 4A	Length (miles)	19.5	19.1	19.9	19.6	19.0	20.0
	Travel Time (minutes)	28	25	18	26	22	18
	Speed (MPH)	42	46	68	45	51	69
Alternative 7	Length (miles)	19.3	19.6	17.9	19.8	19.6	18.1
	Travel Time (minutes)	28	21	16	25	20	16
	Speed (MPH)	42	56	69	48	58	68
Alternative 8	Length (miles)	19.5	19.8	18.4	19.3	19.1	18.4
	Travel Time (minutes)	23	22	16	22	21	16
	Speed (MPH)	52	55	70	52	56	69

2.8.2 Traffic Operations Analyses for Construction Phase 1 Scenarios

The results of the 2023 traffic capacity analyses for the seven Detailed Study Alternatives with the completion of both Construction Phase 1 scenarios (CP1 – S1 and CP1 – S2) in comparison to the No-Build Alternative for 2045 build conditions are discussed in the sections below. The traffic capacity analyses for the two Construction Phase 1 scenarios are based on the March 2023 traffic forecasts for future year 2045 for both AADT and ASWT conditions. The two Construction Phase 1 scenarios were evaluated using TransModeler in terms of the same MOEs used for the traffic capacity analyses for the

entire Detailed Study Alternatives (Section 2.8.1), including control delay, intersection and freeway level of service, and queue lengths. As with the analysis for the entire Detailed Study Alternatives, the traffic capacity analyses for the two Construction Phase 1 scenarios also include 2045 travel times analysis. The 2045 AADT volumes, LOS results, and travel times shown for the No-Build Alternative in the summary tables in this section in comparison to the two Construction Phase 1 scenarios are the same as shown for the No-Build Alternative in comparison to the entire Detailed Study Alternatives in the corresponding tables in Section 2.8.1.

2.8.2.1 Year 2045 Build Traffic Projections

Table 2-13 compares projected future year 2045 AADT volumes in vpd for major study area roadways for the seven Detailed Study Alternatives with the completion of both Construction Phase 1 scenarios (CP1 – S1 and CP2 – S2) and the No-Build Alternative. Table 2-14 provides the same comparisons for 2045 ASWT volumes. The 2045 AADT volumes shown for the No-Build Alternative in the summary tables below in comparison to the two Construction Phase 1 scenarios are the same as shown for the No-Build Alternative in comparison to the entire Detailed Study Alternatives in the corresponding tables in Section 2.8.1.1. Year 2045 projected AADT volumes for the two Construction Phase 1 scenarios and the surrounding roadway network are shown on Figures 15V through 15AA, and Figures 16V through 16AA show the 2045 projected ASWT volumes.

As shown in Table 2-13 and Table 2-14, the 2045 traffic forecasts for the two Construction Phase 1 scenarios indicate that there is expected to be a decrease in future traffic volumes under both AADT and ASWT conditions on existing US 17 between SC 9 and the North Carolina State line with both scenarios, but CP1 – S2 diverts substantially more of the future traffic away from existing US 17 than CP1 – S1. The two Construction Phase 1 scenarios are also both forecast to divert future traffic away from S-57 (Wampee Road) between SC 9 and S-111 (Little River Road), but CP1 – S2 is forecast to provide a greater reduction in future traffic volumes on this section of S-57 than CP1 – S1. Both Construction Phase 1 scenarios are expected to provide approximately the same moderate decrease in future traffic volumes on SC 9 between US 17 and S-57 under both AADT and ASWT conditions in comparison to No-Build conditions. Because CP1 – S1 only extends as far as S-111, the proposed Carolina Bays Parkway Extension is forecast to carry substantially lower future traffic volumes in South Carolina with CP1 – S1 than with CP1 – S2 under both future traffic conditions. CP1 – S1 will also result in a 53 percent increase in traffic along S-111 and a 17 percent increase along S-50 under ASWT conditions compared to No-Build traffic volumes. Traffic volumes along other key roads in South Carolina are projected to remain similar to No-Build conditions with either CP1 – S1 or CP1 – S2 in place in 2045.

For US 17 in North Carolina between the South Carolina State Line and Hickman Road, CP1 – S2 is forecast to divert a moderate amount of traffic under both AADT and ASWT conditions, whereas CP1 – S1 is not forecast to divert any future traffic from this section of existing US 17. However, future traffic volumes are expected to increase on Hickman Road in North Carolina with both of the Construction Phase 1 scenarios. The future 2045 traffic volumes on existing US 17 in North Carolina to the north of Hickman Road and along other key routes in North Carolina are expected to remain virtually unchanged from No-Build conditions with both of the Construction Phase 1 scenarios under both AADT and ASWT conditions.

2.8.2.2 Year 2045 Build Capacity Analysis

Table 2-15 provides a summary comparison of the future year 2045 freeway segment and intersection/ interchange LOS under AADT volume conditions for the seven Detailed Study Alternatives with the

Table 2-13. 2045 AADT Volumes for No-Build and Construction Phase 1 Scenarios

Roadway Segment	2045 AADT Volumes (vpd)		
	No Build	CP1 S2	CP1 S1
South Carolina			
US 17 north of SC 9 to US 17 at North Carolina State Line	23,100 – 59,500	19,100 – 49,400	22,700 – 53,200
S-57 (Wampee Rd) west of SC 9 to S-57 east of S-111 (Little River Rd)	13,700 – 19,900	9,700 – 13,500	13,200 – 16,200
SC 9 north of US 17 to SC 9 north of S-57 (Wampee Road)	33,300 – 49,100	31,400 – 46,000	32,200 – 46,600
Sea Mountain Hwy south of SC 90 to Sea Mountain Hwy south of SC 9	13,600 – 16,900	14,000 – 16,900	13,800 – 16,900
SC 31 west of SC 9	49,200	52,500	51,400
SC 90 west of US 17 to SC 90 west of Sea Mountain Highway	16,300 – 17,300	15,700 – 16,500	16,100 – 16,900
S-111 (Little River Rd) south of S-57 (Wampee Rd)	6,400	5,000	10,000
S-50 (Mineola Ave) south of S-111 (Little River Rd)	11,400	12,600	13,400
Carolina Bays Parkway Extension north of SC 9 to North Carolina State Line	NA	14,600 – 23,900	14,400
North Carolina			
US 17 at South Carolina State Line to US 17 west of SR 1303 (Hickman Road)	23,000 – 24,500	20,600 – 21,600S	22,800 – 24,100
US 17 east of SR 1303 (Hickman Road) to US 17 north of NC 130	30,700 – 40,700	32,300 – 41,100	30,900 – 40,700
SR 1303 (Hickman Rd) west of SR 1300 (Ash Little River Rd/ Calabash Rd) to SR 1303 west of US 17	13,700 – 15,100	11,300 – 16,900	15,300 – 17,300
NC 904 (Seaside Rd) south of US 17 to NC 904 (Longwood Rd) north of SR 1304 (Pea Landing Rd)	7,700 – 16,500	7,500 – 14,900	7,700 – 14,500
NC 130 west of US 17 SB ramps to NC 130 east of US 17 NB ramps	15,400 – 16,200	15,400 – 16,200	15,400 – 16,200
Carolina Bays Parkway Extension from South Carolina State Line to Ash Little River Road	NA	14,600	NA

completion of both Construction Phase 1 scenarios and the No-Build Alternative, and Table 2-16 provides the same summary comparison for ASWT volume conditions. The comparison is provided for both the overall project study area and for locations within the project construction limits. As shown in these tables, the study area analyzed in the traffic capacity analysis for the two Construction Phase 1 scenarios encompasses multiple intersections, interchanges, and freeway segments that are outside of the anticipated construction limits for the proposed project, so they will not be directly impacted by construction of the project. However, these locations are anticipated to experience some improvement in traffic operations by virtue of reduced volumes rather than geometric improvements. The same overall project study area that was analyzed for the Detailed Study Alternatives in Section 2.8.1.2 was used for the two Construction Phase 1 scenarios. In addition, the 2045 freeway and intersection LOS results shown for the No-Build Alternative in the summary tables below in comparison to the two

Table 2-14. 2045 ASWT Volumes for No-Build and Construction Phase 1 Scenarios

Roadway Segment	2045 ASWT Volumes (vpd)		
	No Build	CP1 S2	CP1 S1
South Carolina			
US 17 north of SC 9 to US 17 at North Carolina State Line	27,400 – 67,800	22,800 – 56,400	26,900 – 60,700
S-57 (Wampee Rd) west of SC 9 to S-57 east of S-111 (Little River Rd)	15,000 – 22,400	11,300 – 14,600	14,500 – 18,800
SC 9 north of US 17 to SC 9 north of S-57 (Wampee Road)	38,700 – 55,400	36,400 – 51,900	37,300 – 52,500
Sea Mountain Hwy south of SC 90 to Sea Mountain Hwy south of SC 9	15,200 – 18,700	15,700 – 18,600	15,400 – 18,700
SC 31 west of SC 9	56,200	59,900	58,700
SC 90 west of US 17 to SC 90 west of Sea Mountain Highway	18,600 – 19,600	17,900 – 18,600	18,300 – 19,100
S-111 (Little River Rd) south of S-57 (Wampee Rd)	7,000	9,100	10,700
S-50 (Mineola Ave) south of S-111 (Little River Rd)	12,400	13,600	14,500
Carolina Bays Parkway Extension north of SC 9 to North Carolina State Line	NA	16,700 – 27,300	16,400
North Carolina			
US 17 at South Carolina State Line to US 17 west of SR 1303 (Hickman Road)	26,100 – 28,600	23,300 - 24,600	25,800 – 28,100
US 17 east of SR 1303 (Hickman Road) to US 17 north of NC 130	35,100 – 45,900	36,700 – 46,400	35,300 – 45,900
SR 1303 (Hickman Rd) west of SR 1300 (Ash Little River Rd/ Calabash Rd) to SR 1303 west of US 17	16,000 – 17,300	12,800 – 19,600	18,300 – 19,800
NC 904 (Seaside Rd) south of US 17 to NC 904 (Longwood Rd) north of SR 1304 (Pea Landing Rd)	8,100 – 19,100	7,900 – 17,400	8,100 – 16,500
NC 130 west of US 17 SB ramps to NC 130 east of US 17 NB ramps	17,300 – 18,300	17,300 – 18,300	17,300 – 18,300
Carolina Bays Parkway Extension from South Carolina State Line to Ash Little River Road	NA	16,700	NA

Construction Phase 1 scenarios are the same as shown for the No-Build Alternative in comparison to the entire Detailed Study Alternatives in the corresponding tables in Section 2.8.1.2. Figures 17O through 17R summarize 2045 intersection, interchange, and freeway segment LOS for the two Construction Phase 1 scenarios for AADT conditions, for both the AM and PM peak hours, and Figures 18O through 18R summarize the same information for 2045 ASWT conditions.

As shown in Table 2-15 and Table 2-16, while both Construction Phase 1 scenarios provide some level of service improvement over the No-Build conditions, there will be many intersections and freeway segments that will still have a poor level of service with these two scenarios. Under CP1 – S2, 24 percent of the freeway segments and 36 percent of the intersections in the overall study area will experience

Table 2-15. 2045 AADT Level of Service Summary for No-Build and Construction Phase 1 Scenarios

Alternatives	Type	Overall Study Area			Within Limits of Construction		
		Acceptable LOS*	Unacceptable LOS*	Percent Acceptable	Acceptable LOS*	Unacceptable LOS*	Percent Acceptable
No-Build	Freeway	27	8	77.1	N/A	N/A	N/A
	Intersections	31	14	68.9	N/A	N/A	N/A
CP1 – S2	Freeway	48	3	94.1	29	0	100.0
	Intersections	43	12	78.2	9	0	100.0
CP1 – S1	Freeway	39	3	92.9	29	0	100.0
	Intersections	45	7	86.5	4	1	80.0

*Note that SCDOT has established a goal of LOS C for its state roads, while NCDOT has established the target goal of LOS D for system level planning analysis.

Table 2-16. 2045 ASWT Level of Service Summary for No-Build and Construction Phase 1 Scenarios

Alternatives	Type	Overall Study Area			Within Limits of Construction		
		Acceptable LOS*	Unacceptable LOS*	Percent Acceptable	Acceptable LOS*	Unacceptable LOS*	Percent Acceptable
No-Build	Freeway	20	15	57.1	N/A	N/A	N/A
	Intersections	23	22	51.1	N/A	N/A	N/A
CP1 – S2	Freeway	39	12	76.5	29	0	100.0
	Intersections	35	20	63.6	6	3	66.7
CP1 – S1	Freeway	29	13	69.0	15	0	100.0
	Intersections	44	8	84.6	5	0	100.0

*Note that SCDOT has established a goal of LOS C for its state roads, while NCDOT has established the target goal of LOS D for system level planning analysis.

unacceptable LOS in 2045 under ASWT conditions. Under CP1 – S1, 31 percent of the freeway segments and 15 percent of the intersections will still operate at unacceptable LOS under ASWT conditions. The results under AADT conditions are slightly better, with 6 percent of the freeway segments failing and 22 percent of the intersections failing for CP1 – S2. While 7 percent of the freeway sections and 13 percent of the intersections fail for CP1 – S1.

Table 2-17 and Table 2-18 summarize the LOS and associated delay for the signalized intersections analyzed within the study area for the seven Detailed Study Alternatives with the completion of both Construction Phase 1 scenarios and the No-Build Alternative under future year 2045 AADT and ASWT conditions, respectively. The 2045 signalized intersection LOS results shown for the No-Build Alternative in the summary tables below in comparison to the two Construction Phase 1 scenarios are the same as shown for the No-Build Alternative in comparison to the entire Detailed Study Alternatives in the corresponding tables in Section 2.8.1.2.

Table 2-17. 2045 AADT Signalized Intersection Level of Service for No-Build and Construction Phase 1 Scenarios

Int. No.[1]	Intersection Name	No Build		CP1 S2		CP1 S1	
		Delay in Seconds (LOS)[2]					
		AM	PM	AM	PM	AM	PM
South Carolina							
1	SC 9/S-57 (Wampee Rd)	**126.1 (F)**	**101.9 (F)**	**37.6 (D)****	27.5 (C)*	34.3 (C)**	**39.2 (D)****
2	SC 9/SC 31 SB Off Ramp[3]	NA	NA	14.4 (B)*	34.2 (C)**	11.8 (B)**	1.4 (A)**
	SC 9/SC 31 NB Off Ramp[3]	NA	NA	25.9 (C)*	15.5 (B)	21.7 (C)*	32.1 (C)
3	SC 9/Food Lion Dr/Sea Mountain Hwy	**127.9 (F)**	**148.9 (F)**	**49.3(D)****	**69.9 (E)****	23.0 (C)**	30.4 (C)**
4	SC 9 SB Off Ramp/SC 90	**102.4 (F)**	**57.0 (E)****	22.9 (C)**	**59.0 (E)****	27.7 (C)*	7.9 (A)*
5	US 17/SC 9 NB Off Ramp/ SC 90[3]	NA	NA	32.7 (C)**	**48.7 (D)****	14.4 (B)*	25.4 (C)**
6	US 17/SC 90/Fairway Dr	29.4 (C)**	**51.1 (D)****	17.7 (B)*	**71.7 (E)****	31.6 (C)*	29.8 (C)**
7	US 17/River Hills Dr/ Coquina Harbor Dr	23.2 (C)**	21.8 (C)**	23.9 (C)**	23.5 (C)**	17.4 (B)*	12.0 (B)**
8	US 17/Horseshoe Rd/ Baker St	31.8 (C)**	23.8 (C)**	12.7 (B)*	18.6 (B)**	20.7 (C)**	23.0 (C)**
9	US 17/Pinehurst Circle	9.6 (A)**	8.4 (A)**	12.1 (B)**	14.3 (B)**	11.0 (B)**	7.7 (A)**
10	US 17/S-50 (Mineola Ave)	24.1 (C)**	26.7 (C)**	**51.5 (D)****	**43.1 (D)****	30.5 (C)**	33.5 (C)**
11	US 17 SB/Heather Glen Way[3]	NA	NA	15.5 (B)	11.2 (B)*	10.1 (B)	13.8 (B)*
	US 17 NB/Heather Glen Way[3]	NA	NA	14.9 (B)*	19.2 (B)*	16.7 (B)*	11.2 (B)
14	US 17/Heather Lakes Dr/ Pavilion Dr[3]	NA	NA	11.8 (B)*	23.9 (C)*	15.6 (B)**	13.0 (B)*
20	US 17/Graystone Blvd/ SC 179	23.7 (C)**	33.2 (C)**	**35.1 (D)****	29.9 (C)**	23.6 (C)**	29.8 (C)**
21	S-57 (Wampee Rd)/ S-111 (Little River Rd)[4]	NA	NA	NA	NA	**45.2 (D)***	**64.9 (E)****
36	SC 90/Sea Mountain Hwy	**112.1 (F)**	**83.9 (F)**	**50.8 (D)****	**60.7 (E)****	**43.5 (D)***	**66.5 (E)****
NA[5]	Carolina Bays Parkway Ext./ S-111 (Little River Rd)	NA	NA	NA	NA	26.9 (C)*	32.4 (C)*
NA[5]	S-50 (Mineola Ave)/S-111 (Brooksville Rd)[3]	NA	NA	NA	NA	**38.2 (D)***	25.7 (C)
North Carolina							
12	US 17 NB/NC 904 NB[6]	24.8 (C)	29.6 (C)	23.6 (C)	31.1 (C)	19.5 (B)	26.5 (C)
	US 17 SB/NC 904 SB[6]	22.4 (C)	15.5 (B)	23.2 (C)*	10.7 (B)*	15.7 (B)*	11.0 (B)
15	US 17/SR 1300 (Calabash Rd)/SR 1168 (Country Club Dr)	**46.0 (D)****	**52.1 (D)****	**54.3 (D)****	**45.3 (D)****	**40.6 (D)***	**35.9 (D)***
NA[5]	US 17 SB U-turn south of US 17/Hickman Rd[7]	NA	NA	26.1 (C)**	**36.6 (D)**	**39.6 (D)***	**49.8 (D)***
17	US 17/Hickman Rd[7]	NA	NA	**35.6 (D)***	**42.1 (D)**	**47.5 (D)***	**134.8 (F)**
NA[5]	US 17 SB U-turn south of US 17/Middleton Drive[3,8]	NA	NA	9.8 (A)	4.9 (A)	11.0 (B)	6.2 (A)
18	US 17/Middleton Drive[3,8]	NA	NA	21.0 (C)*	15.6 (B)	16.9 (B)	**54.4 (D)***

Table 2-17. 2045 AADT Signalized Intersection Level of Service for No-Build and Construction Phase 1 Scenarios (continued)

Int. No.[1]	Intersection Name	No Build		CP1 S2		CP1 S1	
		Delay in Seconds (LOS)[2]					
		AM	PM	AM	PM	AM	PM
NA[5]	US 17 SB U-turn west of SR 1304 (Pea Landing Rd)/ SR 1165 (Thomasboro Rd)[9]	NA	NA	11.4 (B)**	12.1 (B)*	7.9 (A)*	5.7 (A)*
19	US 17/SR 1304 (Pea Landing Rd)[9]	22.4 (C)**	29.2 (C)**	23.3 (C)*	10.9 (B)	15.4 (B)	18.4 (B)
	US 17/SR 1165 (Thomasboro Rd)[9]			21.5 (C)*	22.2 (C)	13.6 (B)	17.2 (B)
NA[5]	US 17 NB U-turn east of SR 1304 (Pea Landing Rd)/ SR 1165 (Thomasboro Rd)[9]	NA	NA	8.3 (A)**	14.5 (B)	6.9 (A)	14.9 (B)*
22	SR 1303 (Hickman Rd)/SR 1300 (Ash Little River Rd/ Calabash Rd)[3]	NA	NA	28.5 (C)*	31.8 (C)*	NA	NA
31	US 17/SR 1319 (Union School Rd)	1.9 (A)**	2.2 (A)**	5.6 (A)**	0.7 (A)**	3.2 (A)**	0.4 (A)**
32	US 17/SR 1184 (Ocean Isle Beach Rd)[10]	NA	NA	34.9 (C)*	26.1 (C)	21.8 (C)	26.1 (C)
NA[5]	US 17 NB U-turn east of SR 1184 (Ocean Isle Beach Rd)[10]	NA	NA	8.5 (A)**	4.9 (A)*	3.8 (A)	5.7 (A)*
33	US 17 Bus WB/US 17 NB[11]	23.1 (C)	28.7 (C)	**42.5 (D)****	**43.7 (D)***	27.6 (C)	34.0 (C)
	Old Shallotte Rd/US 17 SB[11]	20.5 (C)	11.9 (B)	25.7 (C)	12.7 (B)	15.5 (B)	12.0 (B)
34	US 17 SB Loop/NC 130[12]	18.4 (B)*	32.7 (C)*	25.9 (C)**	**46.9 (D)****	**38.7 (D)****	30.4 (C)*
35	US 17 NB Loop/NC 130/ Visitor Center[12]	12.3 (B)*	8.3 (A)**	17.5 (B)**	11.9 (B)**	15.2 (B)**	13.7 (B)**
141	US 17 SB U-turn west of US 17/NC 904[6]	19.8 (B)	27.6 (C)*	12.1 (B)	19.7 (B)*	15.2 (B)*	18.7 (B)*
143	US 17 NB U-turn east of US 17/NC 904[6]	18.5 (B)*	17.1 (B)*	14.7 (B)	16.4 (B)*	16.1 (B)*	12.8 (B)*
144	US 17 NB U-turn north of US 17/Old Shallotte Rd/US 17 Bus (Main St)[11]	23.8 (C)*	21.9 (C)*	21.6 (C)	27.1 (C)*	23.1 (C)*	26.3 (C)*
145	US 17 SB U-turn south of US 17/Old Shallotte Rd/US 17 Bus (Main St)[11]	21.4 (C)*	25.6 (C)*	**46.1 (D)****	15.7 (B)*	19.4 (B)*	14.1 (B)*

[1]Intersection numbers are shown on Figures 6 through 9 unless otherwise noted.
[2]Overall LOS is presented for signalized intersections. Asterisks denote one or more approaches during one of the peak hours are LOS E (*) or LOS F (**). Shading is used to highlight signalized intersections identified in the table as operating at an overall LOS D (blue shading), LOS E (orange shading), or LOS F (red shading).
[3]Intersection is currently unsignalized; however, a traffic signal was included in the 2045 AADT and ASWT LOS analyses for the two Construction Phase 1 scenarios. A traffic signal was also included in these locations for the 2045 AADT and ASWT LOS analyses for the seven Detailed Study Alternatives, with the exception of the US 17/Middleton Drive, SR 1303 (Hickman Road)/SR 1300 (Ash Little River Road/Calabash Road), and S-50 (Mineola Avenue)/S-111 (Brooksville Road) intersections.
[4]Although the S-57 (Wampee Road)/S-111 (Little River Road) intersection was analyzed as unsignalized in the No-Build Conditions traffic capacity analyses conducted in 2018 and 2019, a traffic signal was installed at the intersection in late 2022 as part of SCDOT STIP Project P038944. A traffic signal was included in the 2045 AADT and ASWT LOS analyses for the two Construction Phase 1 scenarios, as applicable.
[5]Intersection is not numbered on Figures 6 through 9.
[6]Intersection is analyzed as part of the future Synchronized Street at the US 17/NC 904 intersection (NCDOT STIP Project R-5851).
[7]Intersection is analyzed as part of the recently completed Synchronized Street at the US 17/Hickman Road intersection (NCDOT STIP Project W-5703H).
[8]With the two Construction Phase 1 scenarios, the currently unsignalized US 17/Middleton Drive intersection was analyzed as a signalized Synchronized Street intersection (i.e., left turns prohibited from Middleton Drive onto US 17 northbound).

Table 2-17. 2045 AADT Signalized Intersection Level of Service for No-Build and Construction Phase 1 Scenarios (continued)

[9]Intersection is analyzed as part of the recently completed Synchronized Street at the US 17/SR 1304 (Pea Landing Road)/SR 1165 (Thomasboro Road) intersection (NCDOT STIP Project W-5601GA).
[10]Intersection is analyzed as part of the recently constructed Synchronized Street at the US 17/SR 1184 (Ocean Isle Beach Road) intersection.
[11]Intersection is analyzed as part of the future Synchronized Street at the US 17/US 17 Business (Main Street)/Old Shallotte Road intersection (NCDOT STIP Project R-5857).
[12]Both US 17 ramp/NC 130 intersections are currently unsignalized; however, due to the extent of congestion observed in the initial 2045 No-Build analysis simulations, traffic signals at both intersections were included in the 2045 AADT and ASWT LOS analyses for the No-Build Alternative and the two Construction Phase 1 scenarios, as well as the seven Detailed Study Alternatives. Although no specific project has been identified at this time to provide these improvements, it is reasonable to assume they could be in place by the 2045 design year.

Table 2-18. 2045 ASWT Signalized Intersection Level of Service for No Build and Construction Phase 1 Scenarios

Int. No.[1]	Intersection Name	No Build		CP1 S2		CP1 S1	
		Delay in Seconds (LOS)[2]					
		AM	PM	AM	PM	AM	PM
South Carolina							
1	SC 9/S-57 (Wampee Rd)	**173.4 (F)**	**177.6 (F)**	**68.5 (E)****	**65.4 (E)****	**70.9 (E)****	**73.2 (E)****
2	SC 9/SC 31 SB Off Ramp[3]	NA	NA	**36.9 (D)****	22.4 (C)*	10.3 (B)*	11.8 (B)**
	SC 9/SC 31 NB Off Ramp[3]	NA	NA	26.5 (C)*	24.3 (C)	22.1 (C)*	29.8 (C)
3	SC 9/Food Lion Dr/Sea Mountain Hwy	**110.8 (F)**	**239.8 (F)**	29.7 (C)**	**37.8 (D)****	26.8 (C)**	33.8 (C)**
4	SC 9 SB Off Ramp/SC 90	**128.1 (F)**	**56.8 (E)****	**86.2 (F)**	34.0 (C)**	30.3 (C)**	1.3 (A)**
5	US 17/SC 9 NB Off Ramp/ SC 90[3]	NA	NA	**54.6 (D)****	34.4 (C)*	15.8 (B)*	21.7 (C)*
6	US 17/SC 90/Fairway Dr	**74.6 (E)****	**61.9 (E)****	34.6 (C)**	**50.8 (D)****	30.1 (C)**	31.5 (C)*
7	US 17/River Hills Dr/ Coquina Harbor Dr	**72.9 (E)****	34.8 (C)**	**40.6 (D)****	24.9 (C)**	33.6 (C)*	19.1 (B)**
8	US 17/Horseshoe Rd/ Baker St	**55.9 (E)****	**61.8 (E)****	14.4 (B)*	29.5 (C)**	23.2 (C)**	32.1 (C)**
9	US 17/Pinehurst Circle	18.0 (B)**	**59.4 (E)****	17.8 (B)**	23.3 (C)**	10.1 (B)**	8.7 (A)**
10	US 17/S-50 (Mineola Ave)	22.3 (C)**	**48.6 (D)****	26.3 (C)**	**44.7 (D)****	21.2 (C)*	33.9 (C)**
11	US 17 SB/Heather Glen Way[3]	NA	NA	13.4 (B)	11.5 (B)*	12.1 (B)	15.1 (B)
	US 17 NB/Heather Glen Way[3]	NA	NA	15.3 (B)	14.1 (B)*	14.0 (B)	10.7 (B)*
14	US 17/Heather Lakes Dr/ Pavilion Dr[3]	NA	NA	14.0 (B)*	24.2 (C)**	17.6 (B)*	12.7 (B)**
20	US 17/Graystone Blvd/ SC 179	**46.2 (D)****	**68.6 (E)****	**40.6 (D)****	**58.4 (E)****	**38.6 (D)****	**76.6 (E)****
21	S-57 (Wampee Rd)/ S-111 (Little River Rd)[4]	NA	NA	NA	NA	**66.8 (E)****	**63.7 (E)****
36	SC 90/Sea Mountain Hwy	**175.8 (F)**	**96.6 (F)**	**109.9 (F)**	**97.0 (F)**	**51.9 (D)****	**122.5 (F)**
NA[5]	Carolina Bays Parkway Ext./ S-111 (Little River Rd)[5]	NA	NA	NA	NA	32.7 (C)*	30.8 (C)*
NA[5]	S-50 (Mineola Ave)/S-111 (Brooksville Rd)[3]	NA	NA	NA	NA	33.8 (C)*	28.7 (C)
North Carolina							
12	US 17 NB/NC 904 NB[6]	34.7 (C)	30.7 (C)	27.0 (C)	30.7 (C)	21.6 (C)	26.8 (C)
	US 17 SB/NC 904 SB[6]	26.9 (C)**	16.4 (B)*	22.0 (C)*	25.7 (C)	18.5 (B)*	10.2 (B)

Table 2-18. 2045 ASWT Signalized Intersection Level of Service for No Build and Construction Phase 1 Scenarios (continued)

Int. No.[1]	Intersection Name	No Build		CP1 S2		CP 1 S1	
		Delay in Seconds (LOS)[2]					
		AM	PM	AM	PM	AM	PM
15	US 17/SR 1300 (Calabash Rd)/SR 1168 (Country Club Dr)	**157.4 (F)**	**159.8 (F)**	**48.6 (D)****	**51.1 (D)****	**43.2 (D)****	**35.7 (D)****
NA[5]	US 17 SB U-turn south of US 17/Hickman Rd[7]	NA	NA	**40.9 (D)***	31.4 (C)	**44.6 (D)***	**52.1 (D)***
17	US 17/Hickman Rd[7]	NA	NA	**55.1 (E)***	32.2 (C)	**47.8 (D)***	**81.7 (F)**
NA[5]	US 17 SB U-turn south of US 17/Middleton Drive[3,8]	NA	NA	12.7 (B)	7.0 (A)	14.9 (B)	8.4 (A)
18	US 17/Middleton Drive[3,8]	NA	NA	18.8 (B)*	13.7 (B)	16.8 (B)	**70.3 (E)***
NA[5]	US 17 SB U-turn west of SR 1304 (Pea Landing Rd)/ SR 1165 (Thomasboro Rd)[9]	NA	NA	11.9 (B)**	13.5 (B)*	6.3 (A)*	7.1 (A)*
19	US 17/SR 1304 (Pea Landing Rd)[9]	26.4 (C)**	**41.2 (D)****	17.4 (B)*	21.4 (C)	16.1 (B)	21.8 (C)
	US 17/SR 1165 (Thomasboro Rd)[9]			25.6 (C)*	18.8 (B)	15.2 (B)	18.0 (B)
NA[5]	US 17 NB U-turn east of SR 1304 (Pea Landing Rd)/ SR 1165 (Thomasboro Rd)[9]	NA	NA	13.5 (B)**	7.9 (A)	14.7 (B)**	12.0 (B)*
22	SR 1303 (Hickman Rd)/SR 1300 (Ash Little River Rd/ Calabash Rd)[3]	NA	NA	33.0 (C)**	29.7 (C)*	NA	NA
31	US 17/SR 1319 (Union School Rd)	3.0 (A)**	1.5 (A)**	11.6 (B)**	3.5 (A)**	4.8 (A)**	0.3 (A)**
32	US 17/SR 1184 (Ocean Isle Beach Rd)[10]	NA	NA	**35.5 (D)***	29.2 (C)	22.5 (C)	29.0 (C)
NA[5]	US 17 NB U-turn east of SR 1184 (Ocean Isle Beach Rd)[10]	NA	NA	4.5 (A)**	4.0 (A)*	2.1 (A)	5.5 (A)*
33	US 17 Bus WB/US 17 NB[11]	27.7 (C)	29.5 (C)	**56.3 (E)****	**53.2 (D)****	**36.3 (D)***	**49.0 (D)***
	Old Shallotte Rd/US 17 SB[11]	19.8 (B)	13.4 (B)	23.9 (C)	27.2 (C)	15.3 (B)	16.4 (B)
34	US 17 SB Loop/NC 130[12]	22.5 (C)*	**71.5 (E)****	**49.8 (D)****	**74.7 (E)****	**53.8 (D)****	**69.7 (E)****
35	US 17 NB Loop/NC 130/ Visitor Center[12]	15.2 (B)*	17.4 (B)**	17.5 (B)**	16.2 (B)*	19.4 (B)**	12.4 (B)*
141	US 17 SB U-turn west of US 17/NC 904[6]	13.8 (B)	12.8 (B)	14.6 (B)	33.6 (C)	15.8 (B)*	18.8 (B)*
143	US 17 NB U-turn east of US 17/NC 904[6]	24.1 (C)**	17.9 (B)	12.8 (B)*	9.3 (A)*	17.6 (B)*	11.2 (B)*
144	US 17 NB U-turn north of US 17/Old Shallotte Rd/US 17 Bus (Main St)[11]	23.0 (C)*	17.2 (B)*	23.3 (C)	33.4 (C)*	20.1 (C)	26.9 (C)*
145	US 17 SB U-turn south of US 17/Old Shallotte Rd/US 17 Bus (Main St)[11]	20.0 (C)	31.5 (C)*	**36.4 (D)****	23.3 (C)*	19.8 (B)*	14.9 (B)*

[1]Intersection numbers are shown on Figures 6 through 9 unless otherwise noted.
[2]Overall LOS is presented for signalized intersections. Asterisks denote one or more approaches during one of the peak hours are LOS E (*) or LOS F (**). Shading is used to highlight signalized intersections identified in the table as operating at an overall LOS D (blue shading), LOS E (orange shading), or LOS F (red shading).
[3]Intersection is currently unsignalized; however, a traffic signal was included in the 2045 AADT and ASWT LOS analyses for the two construction Phase 1 scenarios. A traffic signal was also included in these locations for the 2045 AADT and ASWT LOS analyses for the seven

Table 2-18. 2045 ASWT Signalized Intersection Level of Service for No Build and Construction Phase 1 Scenarios (continued)

Detailed Study Alternatives, with the exception of the US 17/Middleton Drive, SR 1303 (Hickman Road)/SR 1300 (Ash Little River Road/ Calabash Road), and S-50 (Mineola Avenue)/S-111 (Brooksville Road) intersections.
[4]Although the S-57 (Wampee Road)/S-111 (Little River Road) intersection was analyzed as unsignalized in the No-Build Conditions traffic capacity analyses conducted in 2018 and 2019, a traffic signal was installed at the intersection in late 2022 as part of SCDOT STIP Project P038944. A traffic signal was included in the 2045 AADT and ASWT LOS analyses for the two Construction Phase 1 scenarios, as applicable.
[5]Intersection is not numbered on Figures 6 through 9.
[6]Intersection is analyzed as part of the future Synchronized Street at the US 17/NC 904 intersection (NCDOT STIP Project R-5851).
[7]Intersection is analyzed as part of the recently completed Synchronized Street at the US 17/Hickman Road intersection (NCDOT STIP Project W-5703H).
[8]With the two Construction Phase 1 scenarios, the currently unsignalized US 17/Middleton Drive intersection was analyzed as a signalized Synchronized Street intersection (i.e., left turns prohibited from Middleton Drive onto US 17 northbound).
[9]Intersection is analyzed as part of the recently completed Synchronized Street at the US 17/SR 1304 (Pea Landing Road)/SR 1165 (Thomasboro Road) intersection (NCDOT STIP Project W-5601GA).
[10]Intersection is analyzed as part of the recently constructed Synchronized Street at the US 17/SR 1184 (Ocean Isle Beach Road) intersection.
[11]Intersection is analyzed as part of the future Synchronized Street at the US 17/US 17 Business (Main Street)/Old Shallotte Road intersection (NCDOT STIP Project R-5857).
[12]Both US 17 ramp/NC 130 intersections are currently unsignalized; however, due to the extent of congestion observed in the initial 2045 No-Build analysis simulations, traffic signals at both intersections were included in the 2045 AADT and ASWT LOS analyses for the No-Build Alternative and the two Construction Phase 1 scenarios, as well as the seven Detailed Study Alternatives. Although no specific project has been identified at this time to provide these improvements, it is reasonable to assume they could be in place by the 2045 design year.

As shown in Table 2-17, under AADT conditions CP1 – S2 would result in 14 intersections within the study area with failing levels of service. CP1 – S1 would result in nine intersections with poor LOS. As shown in Table 2-18, under ASWT conditions CP1 – S2 would result in 17 intersections within the study area with poor LOS, while CP1 – S1 would result in ten intersections with failing levels of service. It should also be noted that the levels of service for several intersections will be worse than the No-Build conditions for both of these scenarios. Under CP1 – S2, six intersections that are operating acceptably under the No-Build conditions will be failing with that scenario constructed. There will be three intersections that are operating acceptably under the No-Build condition that will be failing with CP1 – S1 constructed. Figures 17O through 17R show the anticipated 2045 AADT LOS for signalized, unsignalized, and proposed roundabout intersections with the two Construction Phase 1 scenarios for both the AM and PM peak hours. Figures 18O through 18R show the same information for 2045 ASWT conditions.

Several intersections will have movements that will begin to fail prior to 2045 for both Construction Phase 1 scenarios. Most notably, the US 17 and Hickman Road intersection is expected to be at LOS E in 2025 in the ASWT scenario for CP1 – S2. Additionally, the roundabout at Ash Little River Road and Carolina Bays Parkway Extension is expected to operate at LOS E in 2025 in the ASWT scenario for CP1 – S2. Under CP1 – S1, the US 17/NC 130 interchange is expected to have an unacceptable level of service in 2025 under ASWT conditions. In addition, the US 17 and Hickman Road intersection is expected to be at LOS E in 2025 in the AADT and ASWT scenarios for CP1 – S1.

2.8.2.3 Year 2045 Travel Time Analysis

Table 2-19 through Table 2-22 summarize the results of the 2023 travel time analysis for the seven Detailed Study Alternatives with the completion of both Construction Phase 1 scenarios and the No-Build Alternative under future year 2045 AADT and ASWT conditions, for both the AM and PM peak hours. The travel time analysis for the two Construction Phase 1 scenarios was conducted using the same methodology as discussed above for the entire Detailed Study Alternatives. The 2045 travel times shown for the No-Build Alternative in the summary tables below in comparison to the two Construction

Phase 1 scenarios are the same as shown for the No-Build Alternative in comparison to the entire Detailed Study Alternatives in the corresponding tables in Section 2.8.1.3.

Table 2-19. 2045 AADT (AM Peak) Travel Time Summary for No-Build and Construction Phase 1 Scenarios

Alternatives	Type	Northbound			Southbound		
		South Route	North Route	CBP Extension	South Route	North Route	CBP Extension
No-Build	Length (miles)	19.6	19.1	N/A	19.7	18.8	N/A
	Travel Time (minutes)	28	29	N/A	30	27	N/A
	Speed (MPH)	42	40	N/A	40	42	N/A
CP1 – S2	Length (miles)	19.7	19.7	19.4	19.5	18.8	19.0
	Travel Time (minutes)	28	27	23	27	24	21
	Speed (MPH)	42	45	50	43	47	53
CP1 – S1	Length (miles)	19.6	19.6	20.5	19.4	18.8	20.3
	Travel Time (minutes)	27	25	27	26	24	26
	Speed (MPH)	43	46	45	45	47	47

Table 2-20. 2045 AADT (PM Peak) Travel Time Summary for No-Build and Construction Phase 1 Scenarios

Alternatives	Type	Northbound			Southbound		
		South Route	North Route	CBP Extension	South Route	North Route	CBP Extension
No-Build	Length (miles)	19.6	19.1	N/A	19.7	18.8	N/A
	Travel Time (minutes)	28	26	N/A	28	26	N/A
	Speed (MPH)	42	44	N/A	42	44	N/A
CP1 – S2	Length (miles)	19.7	19.7	19.4	19.5	18.8	19.0
	Travel Time (minutes)	27	26	24	27	24	21
	Speed (MPH)	43	46	49	43	48	53
CP1 – S1	Length (miles)	19.6	19.6	20.5	19.4	18.8	20.3
	Travel Time (minutes)	27	26	25	27	25	27
	Speed (MPH)	44	42	48	42	46	46

The travel time analysis results in Table 2-19 through Table 2-22 show that the two Construction Phase 1 scenarios are expected to provide a shorter travel time between the project termini for all of the future conditions analyzed than the No-Build Alternative, with CP1 – S2 performing better than CP1 – S1. This is reasonable due to the fact that CP1 – S2 provides a longer travel distance on a high-speed, access-

Table 2-21. 2045 ASWT (AM Peak) Travel Time Summary for No-Build and Construction Phase 1 Scenarios

Alternatives	Type	Northbound			Southbound		
		South Route	North Route	CBP Extension	South Route	North Route	CBP Extension
No-Build	Length (miles)	19.6	19.1	N/A	19.7	18.8	N/A
	Travel Time (minutes)	38	29	N/A	28	31	N/A
	Speed (MPH)	31	40	N/A	42	36	N/A
CP1 – S2	Length (miles)	19.7	19.7	19.4	19.5	18.8	19.0
	Travel Time (minutes)	29	28	24	27	25	22
	Speed (MPH)	41	42	48	44	46	51
CP1 – S1	Length (miles)	19.6	19.6	20.5	19.4	18.8	20.3
	Travel Time (minutes)	28	26	27	26	25	26
	Speed (MPH)	42	46	45	44	45	47

Table 2-22. 2045 ASWT (PM Peak) Travel Time Summary for No-Build and Construction Phase 1 Scenarios

Alternatives	Type	Northbound			Southbound		
		South Route	North Route	CBP Extension	South Route	North Route	CBP Extension
No-Build	Length (miles)	19.6	19.1	N/A	19.7	18.8	N/A
	Travel Time (minutes)	34	28	N/A	35	30	N/A
	Speed (MPH)	35	41	N/A	33	38	N/A
CP1 – S2	Length (miles)	19.7	19.7	19.4	19.5	18.8	19.0
	Travel Time (minutes)	30	26	23	27	23	21
	Speed (MPH)	39	46	50	43	49	54
CP1 – S1	Length (miles)	19.6	19.6	20.5	19.4	18.8	20.3
	Travel Time (minutes)	27	26	26	28	25	27
	Speed (MPH)	43	43	48	41	45	45

controlled freeway facility compared to the other two-lane and signalized arterial route choices, as well as in comparison to CP1 – S1. CP1 – S2 is expected to provide up to seven minutes of future 2045 travel time savings in comparison to the existing routes (for the northbound south route) during the PM peak under ASWT conditions, and up to six minutes of travel time savings during the PM peak under both AADT and ASWT conditions in comparison to CP1 – S1. With the completion of the proposed project

using either of the Construction Phase 1 scenarios, the existing routes analyzed will experience negligible travel time savings compared to No-Build conditions under ASWT traffic, while those routes will experience small increases in travel time savings under AADT traffic.

Both Construction Phase 1 scenarios provide some short-term level of service benefits compared to No-Build conditions, as explained in Section 2.8.2.2, and both scenarios will result in decreased future traffic volumes along existing US 17 between SC 9 and the North Carolina State Line.

2.9 Costs

The preliminary cost estimates for each of the Detailed Study Alternatives are presented in Table 2-23, and the preliminary cost estimates for the two Construction Phase 1 scenarios are presented in Table 2-24. The cost estimates for both Construction Phase 1 scenarios are based on using the alignment for Alternative 4 (SCDOT/NCDOT Preferred).

Table 2-23. Cost Estimates for Detailed Study Alternatives

	Detailed Study Alternatives*													
	1		1A		2		4		4A		7		8	
	Total		Total		Total		Total		Total		Total		Total	
	SC	NC	SC	NC	SC	NC	SC	NC	SC	NC	SC	NC	SC	NC
Right-of-Way Acquisition Cost (millions)	$139.6		$97.9		$193.2		$121.7		$83.3		$259.2		$227.8	
	$36.8	$102.8	$36.8	$61.1	$38.1	$155.1	$21.9	$99.8	$21.9	$61.5	$25.1	$234.1	$40.1	$187.6
Utility Relocation Cost (millions)	$129.0		$64.6		$165.7		$121.5		$57.7		$140.9		$169.5	
	$34.2	$94.8	$33.5	$31.0	$33.5	$132.2	$26.0	$95.5	$26.0	$31.7	$25.5	$115.4	$28.5	$141.0
Wetland and Stream Mitigation Cost (millions)	$38.5		$43.1		$31.6		$35.2		$39.9		$27.2		$33.3	
	$12.7	$25.7	$12.7	$30.4	$12.7	$18.8	$9.5	$25.7	$9.5	$30.3	$9.4	$17.8	$11.5	$21.7
Construction Cost (millions)	$524.7		$482.2		$461.3		$518.6		$471.1		$424.3		$480.2	
	$145.8	$378.9	$147.1	$335.1	$144.2	$317.1	$128.7	$389.9	$128.8	$342.3	$124.6	$299.7	$157.7	$322.5
Total Cost (millions)	$831.8		$687.8		$851.8		$797.0		$652.0		$851.6		$910.8	
	$229.5	$602.2	$230.1	$457.6	$228.5	$623.2	$186.1	$610.9	$186.2	$465.8	$184.6	$667.0	$237.8	$672.8

*Note: The amounts in this table were rounded to the nearest $100,000, so minor rounding error may exist when adding the individual amounts to get the totals.

Table 2-24. Cost Estimates for Construction Phase 1 Scenarios*

	CP1 S1		CP 1 S2	
	Total		Total	
	SC	NC	SC	NC
Right-of-Way Acquisition Cost (millions)	$32.2		$48.6	
	$32.2	N/A	$29.5	$19.1
Utility Relocation Cost (millions)	$51.1		$58.3	
	$51.1	N/A	$26.0	$32.3
Wetland and Stream Mitigation Cost (millions)	$7.1		$11.4	
	$7.1	N/A	$9.5	$1.9
Construction Cost (millions)	$105.3		$200.6	
	$105.3	N/A	$128.7	$71.9
Total Cost (millions)	$195.7		$318.9	
	$195.7	N/A	$193.7	$125.2

*Note: The cost estimates for both Construction Phase 1 scenarios are based on using the alignment for Alternative 4 (SCDOT/NCDOT Preferred). The amounts in this table were rounded to the nearest $100,000, so minor rounding error may exist when adding the individual amounts to get the totals.

3.0 Affected Environment

This chapter describes the existing conditions and characteristics of the study area that could be affected by the proposed Carolina Bays Parkway Extension. The chapter includes comprehensive information relating to the study area as a whole rather than providing separate descriptions of the area as it relates to each alternative. Information presented relates to the existing social, economic, cultural, physical, and natural environment settings. This chapter provides the basis for determining the specific impacts of each of the seven Detailed Study Alternatives, as discussed in Chapter 4.

3.1 Human Environment

Five technical reports were prepared to document the existing human environment conditions in the Carolina Bays Parkway Extension study area, as well as to analyze the potential impacts to the communities comprising the study area. These technical reports included: *Community Characteristics Report* (CALYX Engineers, January 2018); *Indirect and Cumulative Effects Report* (NV5, December 2023); *Community Characteristics Report Addendum* (NV5, June 2021); *Community Impact Assessment* (STV, February 2023); and *Community Indirect & Cumulative Effects No-Build Land Use Assessment* (STV, December 2023). The Federal Highway Administration (FHWA), NCDOT, and SCDOT recognize that cumulative effects were defined in the Council on Environmental Quality (CEQ) regulations. However, the CEQ regulations are being rescinded. Thus, these reports should be viewed in the context of the definition of effects provided in the February 19, 2025 *Memorandum for Heads of Federal Departments and Agencies* with the subject: *Implementation of the National Environmental Policy Act*. The subject memorandum defines effects as reasonably foreseeable effects of the proposed action consistent with Section 102 of the National Environmental Policy Act (NEPA), which does not employ the term "cumulative effects;" NEPA instead requires consideration of "reasonably foreseeable" effects, regardless of whether or not those effects might be characterized as "cumulative."

City, county, state, and Demographic Study Area (DSA) data were compared to identify characteristics and trends and draw conclusions about the study area. The DSA boundary is displayed on Figure 10. The DSA includes portions of Brunswick County, North Carolina and Horry County, South Carolina in and around the study area. It also includes portions of the following communities: Town of Carolina Shores, Town of Calabash, Town of Sunset Beach, Town of Ocean Isle Beach, and Town of Shallotte in North Carolina; and City of North Myrtle Beach and unincorporated community of Little River (Census Designated Place) in South Carolina. Copies of these technical reports, appended by reference, are located in the project file.

3.1.1 Population Characteristics

The population of Brunswick County and Horry County grew at a fairly rapid rate between 2000 and 2010, but the rate of growth in both counties decreased substantially between 2010 and 2019 (Table 3-1). The population in the DSA grew at a faster rate (55 percent) than either county between 2000 and 2010, but the rate of growth also decreased substantially between 2010 and 2019. However, the population in the DSA, as well as in both counties, grew at rates more than double the North Carolina and South Carolina statewide growth rates during both time periods. The Census Tracts/Block Groups comprising the DSA are shown on Figure 10.

Table 3-1. Population Growth Trends 2000-2019

Jurisdiction	Population				Growth			
	2000[1]	2010[1]	2015[2]	2019[3]	Actual Change 2000 2010	Percent Change 2000 2010	Actual Change 2010 2019	Percent Change 2010 2019
Brunswick County	73,143	107,431	115,926	131,815	34,288	46.9%	24,384	22.7%
Horry County	196,629	269,291	290,730	332,172	72,662	37.0%	62,881	23.4%
North Carolina	8,049,313	9,535,483	9,845,333	10,264,876	1,486,170	18.5%	729,393	7.7%
South Carolina	4,012,012	4,625,364	4,777,576	5,020,806	613,352	15.3%	395,442	8.6%
Demographic Study Area (DSA)	23,118	35,862	39,050	43,811	12,774	55.1%	7,949	22.2%

[1]Minnesota Population Center, National Historical Geographic Information System, Version 11.0. University of Minnesota, 2016 (http://doi.org/10.18128/D050.V11.0).
[2]US Census Bureau, American Community Survey (ACS) 5-YR Estimates (2011-2015), Table B01003 (Total Population).
[3]US Census Bureau, ACS 5-YR Estimates (2015-2019), Table B01003 (Total Population).

The DSA contains a notable retirement population, as documented by local planners across the study area and supported by Census data. As shown in Table 3-2, the median age for the DSA (56.8 years) is slightly higher than the median ages for Brunswick County (53.8 years) and Horry County (45.9 years); however, it is substantially higher than the statewide median ages for North Carolina (38.7 years) and South Carolina (39.4 years). The percentage of residents in the DSA age 65 years or older (34.6 percent) is more than double the North Carolina (15.9 percent) and South Carolina (17.2 percent) statewide percentages. The highest concentrations of elderly persons are located in the Brunswick County portion of the DSA, which contains five Block Groups where more than half of the total population is age 65 or older.

Table 3-2. Age Composition and Median Age

Jurisdiction	Age Range Percentage						Median Age
	<18	18 29	30 49	50 64	65+	80+	
Brunswick County	15.6%	10.1%	19.7%	24.0%	30.5%	4.2%	53.8
Horry County	18.3%	13.7%	22.8%	22.1%	23.2%	3.9%	45.9
North Carolina	22.4%	16.5%	25.8%	19.5%	15.9%	3.5%	38.7
South Carolina	22.0%	16.2%	24.7%	19.9%	17.2%	3.6%	39.4
Demographic Study Area (DSA)	14.0%	9.7%	16.8%	24.9%	34.6%	4.9%	56.8

Source: US Census Bureau, ACS 5-YR Estimates (2015-2019), Table B01002 (Median Age by Sex) and Table B01001 (Sex by Age).

3.1.2 Economic Characteristics

Brunswick County and Horry County rely heavily on tourism. The region consists of many coastal communities enjoyed largely by seasonal residents and visitors. Local planners from across the study

area have noted the importance of tourism, as well as the large retiree population, in shaping the social and economic context of the study area. There are a variety of business and economic resources throughout the study area with majority representation from the recreation, tourism, and service industries, as well as a growing presence of medical service providers.

According to the most recent available data from the North Carolina Department of Commerce (3rd Quarter, 2021), the largest industry sectors in Brunswick County include retail trade, accommodation and food services, and health care and social assistance. Other strong sectors in 2021 included construction, public administration, and educational services. The largest individual full-time employers in Brunswick County include Brunswick County Board of Education and Brunswick County government (each with 1,000+ employees), followed by Walmart, Progress (Duke) Energy, Food Lion, and Brunswick Novant Medical Center (each with 500-999 employees).

Data provided by the South Carolina Department of Employment & Workforce indicates the largest industry sectors in Horry County (3rd Quarter, 2021) include accommodation and food services, retail trade, and health care and social assistance. Other strong sectors in Horry County include educational services, administrative and support and waste management and remediation services, and construction. The largest individual full-time employers in Horry County include Horry County Board of Education, Walmart, Horry County government, Coastal Carolina University, and Conway Hospital (each with 2,000+ employees). McLeod Loris Seacoast Hospital (located within the study area and accessed via SC 9 and Sea Mountain Highway) is also listed as one of the county's top 10 employers by the Myrtle Beach Regional Economic Development Corporation. The largest employers within the study area include McLeod Loris Seacoast Hospital and various county government offices and public schools.

In Brunswick County, approximately 66 percent of working residents live and work within the county, while approximately 28 percent commute to another county. An additional six percent of working residents commute to another state for work. In Horry County, approximately 31 percent of working residents live and work within the county. In contrast, approximately 35 percent of employees commute to Horry County from another county of residence and 34 percent commute from Horry County to another county for work.

3.1.3 Community Facilities and Services

As discussed in the sections below, there are a number of noteworthy community facilities located within the study area (community facilities in the vicinity of the corridors for the Detailed Study Alternatives are shown on Figure 19).

3.1.3.1 Schools

Horry County

North Myrtle Beach High School, on Sea Mountain Highway just north of SC 90, is the only public school located within the study area in Horry County.

Brunswick County

There are three public schools located within the study area in Brunswick County. West Brunswick High School is located on NC 130 just north of the US 17 interchange; Jessie Mae Monroe Elementary School is located on Pea Landing Road just north of US 17; and Union Elementary School is located on Union

School Road just north of US 17. There is also one private school (West Christian Academy) located within the study area in Brunswick County. It is located on Bliss Road just north of US 17.

3.1.3.2 Hospitals

McLeod Health Seacoast Hospital, located in Horry County on SC 9 just west of the US 17 interchange, is the only hospital located within the study area.

3.1.3.3 Parks and Recreation Facilities

A paddling trail follows the Waccamaw River just to the north of the study area within both Horry County and Brunswick County. There are also proposed paddling trails along portions of Cawcaw Swamp and Standard Branch within Brunswick County in the study area that connect to the trail along the Waccamaw River.

Horry County

There are two public parks/recreation centers located within the study area in Horry County. North Strand Recreation Center is located on S-57 just west of SC 9. The recreation center is owned and operated by Horry County and includes a gymnasium with basketball courts and fitness room, fields for baseball, softball, and soccer, and a playground. Vereen Memorial Gardens is located on SC 179 just east of US 17. The site is a regional park owned and operated by Horry County and consists of more than 115 acres of forest and marshland. It also includes the CB Berry Community Center, which provides space for recreational programming and community events, as well as approximately three miles of nature trails and boardwalks that traverse the property and botanical gardens.

Two bicycle routes identified by the South Carolina State Trails Program as State Touring Bicycle Routes pass through the study area. The Northern Crescent Route runs just south of the North Carolina State Line from the mountains to the sea. It follows SC 9 across the study area. The Coastal Route roughly parallels the coastline across South Carolina from North Carolina to Georgia. It follows SC 179, US 17, Mineola Avenue, Little River Road, and Wampee Road across the study area.

Brunswick County

Shallotte Township District Park, on US 17 Business (Main Street) just east of US 17, is the only public park facility located within the study area in Brunswick County. This 68-acre facility is owned and operated by Brunswick County and includes fields for baseball, softball, and soccer, as well as a basketball court, tennis courts, a playground, picnic shelters, and a concession building.

3.1.3.4 Preservation Areas

The Waccamaw River Heritage Preserve is located along the northwestern boundary of the study area in Horry County. The approximately 5,000-acre preserve is a State Conservation Area located along the Waccamaw River and is owned and managed by the South Carolina Division of Natural Resources (SCDNR). The preserve is open to the public year round during daylight hours, and there are seven boat landings along the river to provide public access for boating, including one at Wortham's Ferry, which is located just north of the study area where S-111 terminates at the Waccamaw River.

3.1.3.5 Childcare Facilities

Horry County

One childcare facility is located within the study area in Horry County. It is located in the vicinity of North Myrtle Beach High School along Sea Mountain Highway.

Brunswick County

There are four childcare facilities located within the study area in Brunswick County. One is located on Tree Acres Circle in the Marlowtown community. The other three childcare facilities in Brunswick County are located in the vicinity of Union Elementary School, with one of these facilities located on US 17 at the Union School Road intersection and the other two facilities located along Old Shallotte Road.

3.1.3.6 Golf Courses

The Grand Strand/Myrtle Beach region is a national golfing destination and there are numerous golf courses located throughout the study area. Many of the golf courses are located within residential communities that contain a mix of single-family and multi-family options to accommodate both full-time residents and visiting golfers. Many of the golf communities in Brunswick County offer multiple courses at a single location, while those in Horry County are single courses. All of the courses in the study area are open to public use. The twelve golf courses located within the study area in both Horry and Brunswick Counties are listed in Table 3-3.

Table 3-3. Study Area Golf Courses

County	Golf Course Name	Description
Horry	Colonial Charters	One 18-hole course
Horry	Eagle Nest	One 18-hole course
Horry	River Hills	One 18-hole course, held under conservation easement
Horry	Valley at Eastport	One 18-hole course
Horry	Glen Dornoch	One 18-hole course
Horry	Harbour View	One 18-hole, par three course
Brunswick	Meadowlands	One 18-hole course
Brunswick	Brunswick Plantation	Three 18-hole courses
Brunswick	Carolina Shores	One 18-hole course
Brunswick	Crow Creek	One 18-hole course bisected by Hickman Road
Brunswick	Sandpiper Bay	Three nine-hole courses
Brunswick	Ocean Ridge Plantation	Five 18-hole courses

3.1.3.7 Government Facilities

Horry County

The Ralph Ellis Complex government services center, on Wampee Road just east of the SC 9 intersection in Horry County, contains various state and local government branches. State government services at the complex include Stephens Health Department (South Carolina Department of Health and Environmental Control [SCDHEC]) and a Motor Vehicles Department (SCDOT) branch. Local government services at the complex include the Horry County Magistrate (Little River Office), Horry County Memorial Library – Little River, and Horry County Fire Rescue Station 18.

A Horry County Fire/Rescue Station (Little River Station No. 2) is located within the study area on Baker Street just south of US 17. A South Carolina Welcome Center, operated by the South Carolina Department of Parks, Recreation, and Tourism, is located within the study area on US 17 just south of the SC 179 intersection. The Little River Post Office is located on Horseshoe Road just north of US 17 in the study area. A Horry County Recycling and Solid Waste Convenience Center is located on Little River Road just south of Wampee Road.

Brunswick County

The Town of Carolina Shores' Town Hall is located on Persimmon Road just south of US 17 in the study area. Southwest Brunswick Branch Library is a Brunswick County Public Library located on the north side of US 17 just east of Shingletree Road. The facility is part of the Brunswick Community College system and is also used as an event center. Brunswick Community College also offers continuing education programming for the elderly population at this site.

A Town of Calabash Fire Station (Station 12-2) is located on No. 5 School Road to the west of Pea Landing Road in the northern portion of the study area. The Grissettown-Longwood Volunteer Fire Department and Rescue Station (Station 31) is located on NC 904 (Longwood Road) in the northern portion of the study area. There is also a Brunswick County Emergency Medical Services station on US 17 Business to the east of US 17.

The Carolina Shores Wastewater Treatment Plant, part of the Brunswick County Wastewater System, is located in North Carolina on the South Carolina State Line (between US 17 and NC 179). A Brunswick County Visitor Center, operated by the State of North Carolina, is located on US 17 northbound at the NC 130 interchange.

3.1.3.8 Assisted Living Facilities

Horry County

There are three assisted living facilities within the study area in Horry County: River Park Senior Living on Pecan Street to the east of the SC 31/SC 9 interchange; The Legacy of North Myrtle Beach on US 17 to the east of the SC 9 interchange; and New Haven at Little River on SC 179 to the east of US 17.

The North Strand Senior Center, located at the North Strand Recreation Center on S-57, is operated by the Horry County Council on Aging to provide supportive services and programs for Horry County residents aged 60 and over.

Brunswick County

There are also three assisted living facilities within the study area in Brunswick County: Brunswick County Health and Rehab Center on No. 5 School Road at the Ash Little River Road intersection; Coastal Pointe Assisted Living and Memory Care on US 17 to the east of Ocean Isle Beach Road; and Shallotte Assisted Living Community on Mulberry Street to the east of the US 17/NC 130 interchange.

Brunswick Senior Resources is located on Express Drive in Shallotte. This is a nonprofit agency providing programs and services to adults aged 50 and over, and is a part of Brunswick County Community College.

3.1.3.9 Churches and Cemeteries

There are 40 known churches and 46 known cemeteries located within Horry and Brunswick Counties in the study area.

3.1.3.10 Other Community Facilities

Indigo Farms is an active Century Farm, market, and agritourism operation with farm fields located in both South Carolina and North Carolina along S-57 (Wampee Road) and Hickman Road. The Indigo Farms Produce Market and Garden Center is located on Hickman Road just inside the North Carolina State Line. Indigo Farms is discussed further in Section 3.3.3.2 (Agricultural Resources).

Horry County

There are two water towers operated by Little River Water and Sewerage Company located within the study area. One of these water towers is located on Little River Road just south of Wampee Road, and the second tower is located on San Andres Avenue just north of the US 17/Mineola Avenue intersection. The company's main office is also located within the study area on Little River Road just north of Wampee Road.

There are two marinas in the study area, both of which are located in Coquina Harbor on the south side of US 17 in Little River. Myrtle Beach Yacht Club contains 153 boat slips ranging in size from 38 feet to 65 feet. Lightkeepers Marina contains 115 boat slips ranging in size from 45 feet to 65 feet. Both marinas offer a range of long-term and transient dock slip rental options, and the facilities at both marinas are open to the general public by reservation for a fee.

There are two emergency evacuation bus stops in the study area: Food Lion on SC 9 in Little River and North Myrtle Beach High School on Sea Mountain Highway. When a Mandatory Evacuation Order is issued, Waccamaw Regional Transit Authority (Coast RTA) becomes part of the Horry County Emergency Preparedness initiative to transport residents to local shelters from these bus stops.

Brunswick County

Peoples Funeral Home is located within the study area on the north side of existing US 17 just east of Ocean Isle Beach Road.

3.1.4 Community Cohesion

Community cohesion is the degree of interaction among individuals, groups, and institutions that make up a community. Cohesion refers to residents' sense of belonging to their respective neighborhoods and groups usually as a result of continued association over time. The presence of community cohesion within the study area was identified through field observations, input from local planners and stakeholders during personal interviews, the public meeting process, and documented instances of community interaction in the study area. The presence of stable, long-standing communities indicate community cohesion in both the Horry and Brunswick county portions of the study area. In addition, many residents in the study area inhabit family farmland or have lived in the same location for multiple generations. Instances of family held property was found in the northern portion of the study area in the more rural areas north of S-57 in Horry County and US 17 in Brunswick County where family communities or groups were identified by ownership parcel data. Family communities or groups of family held properties are considered multiple adjacent parcels with the same family name.

Community cohesion is also likely to be found in crossroads locations where community connection and noted interaction have been reported from interviews with local planners and observed during site visits. Brooksville is an identified crossroads community in Horry County in the vicinity of the S-57/S-111 intersection. In Brunswick County, Hickman Crossroads is an identified crossroads community in the vicinity of the Hickman Road/Calabash Road/Ash Little River Road intersection. The Longwood community, located in the northernmost portion of the study area in the vicinity of the NC 904 (Longwood Road)/Etheridge Road intersection, is also a cohesive community.

The proposed Carolina Bays Parkway Extension study area is largely comprised of unincorporated areas in Horry and Brunswick Counties, but contains portions of some small coastal towns and communities located on the inland side of the Intracoastal Waterway. Development in the study area tends to consist of non-residential uses focused along state and US highway routes with residential uses focused along state secondary routes. While there is similarity in the overall mix of development types in the study area, the scale, density, age, and aesthetics of existing development in the study area is notably different in Horry and Brunswick Counties. In addition, because the study area is located in the coastal region, it is a major destination for recreation, tourism, and retirement in both states, all of which are key elements influencing the regional community context.

Little River is an unincorporated community that comprises a substantial part of the South Carolina portion of the study area. Little River includes moderately dense commercial, institutional, and recreational development along the SC 9 and US 17 corridors, with substantial residential development along many of the local streets and state secondary corridors. The section of the US 17 corridor through Little River is the most densely developed part of the study area and carries some of the highest traffic volumes. The Little River community was historically settled as a fishing village prior to any other settlements on the Grand Strand based on its proximity to both the Waccamaw River and Little River Inlet to the Atlantic Ocean. The Little River waterfront, located along the Intracoastal Waterway just south of the study area, is the primary commercial tourism resource and destination in the area, and notably includes the only two casino boats in the state of South Carolina, but the area is also home to six golf courses. McLeod Health Seacoast Hospital is also located on SC 9 just west of the US 17 interchange.

The portion of the study area to the north of SC 9 and south of S-111 is also part of Little River, and it contains predominantly residential uses that include a mix of more recently developed subdivisions and older single family homes, as well as intermittent commercial, institutional (primarily churches), and

light industrial uses clustered near intersections. Subdivision development in this area is clustered along S-57 and S-111. The majority of all recent development activity in this area tends to include residential subdivisions constructed in the past ten to 15 years. Other existing development in the area is older on average. Between S-111 and the North Carolina State Line, agriculture is the predominant use with intermittent single family residential. The overall development pattern is noticeably lower in density and more modest in nature. The S-50 corridor contains a residential-agriculture pattern that is moderately low density and more in kind with the residential pattern across the state line in Brunswick County.

The large majority of the Brunswick County portion of the study area lies within the county's unincorporated jurisdiction. The dominant development pattern includes low density commercial and industrial uses along highway corridors (US 17 and NC 904) and a mix of rural residential and agriculture uses along other secondary routes. The area is also home to seven golf course communities. Much of the land located north of the US 17 corridor is in agricultural use. There are a number of family estates and large and small farming operations. A notable portion of the total land area west of US 17 is actively managed for timber, some of which is under ownership by corporate timber farms. Agricultural resources within the study area are discussed in further detail in Section 3.3.3.2.

The Brunswick County portion of the study area also includes small portions of the Town of Carolina Shores and the Town of Shallotte. Located just north of the South Carolina State Line on both sides of US 17, Carolina Shores is largely comprised of residential subdivisions, of which there are currently six. Approximately half of the subdivisions have been constructed since the town's incorporation in 1998. The northern study area is within the Town of Shallotte. Shallotte is centrally located in Brunswick County and serves as the primary commercial, service, and employment destination for residents of southern and western Brunswick County, including the Brunswick County portion of the study area. The Towns of Calabash, Sunset Beach, and Ocean Isle Beach are located just to the south of the study area.

The study area and immediate vicinity contain more than 130 named residential subdivisions and neighborhoods, which are listed in Table 3-4. The subdivisions in the vicinity of the corridors for the Detailed Study Alternatives are shown on Figure 19. The majority of the subdivisions listed in Table 3-4 are completely built out, but three subdivisions (Bridgewater, Sunset Landing, and Wildwood Village) are still under construction with new sections being added. There are also some vacant single-family residential lots available in these existing subdivisions. There are 10 residential communities in the study area with golf courses, as noted in the table.

Table 3-4. Study Area Subdivisions

Subdivision Name	Location	Location of Neighborhood Access	Jurisdiction
A Place at the River	Little River	US 17	Horry County
Ashton Acres	Loris	S-57	Horry County
Barcelona	Little River	Landing Road (US 17)	Horry County
Bay Forest	Little River	SC 9	Horry County
Bay Tree	Little River	SC 9	Horry County
Beacon Townes	Carolina Shores	US 17	Carolina Shores
Bellamy Mobile Home Park	Little River	Horseshoe Road (US 17)	Horry County
Big Landing Plantation	Little River	SC 179	Horry County

Table 3-4. Study Area Subdivisions (continued)

Subdivision Name	Location	Location of Neighborhood Access	Jurisdiction
Bloom Road Estates	Little River	Blooms Drive (S-111)	Horry County
Bridgewater[1]	Little River	SC 9	Horry County
Brunswick Plantation[2]	Calabash	US 17 & No. 5 School Road	Brunswick County
Calabash Lakes at Carolina Shores	Calabash	Thomasboro Road	Brunswick County
Captain's Choice	Little River	SC 9	Horry County
Carolina Cove	Calabash	Thomasboro Road	Brunswick County
Carolina Crossing	Loris	S-57	Horry County
Carolina Shores Golf & Country Club[2]	Calabash	Country Club Road & Persimmon Road	Carolina Shores
Carolina Shores Acreage Estates	Carolina Shores	Persimmon Road	Carolina Shores
Carolina Shores North	Carolina Shores	US 17	Carolina Shores
Cedar Creek	Little River	SC 90/US 17	Horry County
Cedar Tree	Carolina Shores	US 17	Brunswick County
Cloverleaf	Loris	SC 9	Horry County
Club Villas at Bay Tree	Little River	US 17	Horry County
Colonial Charters[2]	Loris	SC 9 & S-57	Horry County
Coquina Harbor	Little River	US 17	Horry County
Creekside Point	Little River	Mineola Avenue	Horry County
Crow Creek[2]	Calabash	US 17 & Hickman Road	Brunswick County
Crystal Point	Little River	Landing Road (US 17)	Horry County
Cypress Bay	Little River	US 17 & S-111	Horry County
Cypress Lakes	Little River	Little River Road	Horry County
Cypress Village	Little River	US 17	Horry County
Eagle Nest[2]	Little River	US 17	Horry County
Eagle Run	Carolina Shores	Shingletree Road	Brunswick County
Eastport[2]	Little River	US 17	Horry County
Evergreen Heights	Little River	US 17	Horry County
The Farm at Brunswick	Carolina Shores	US 17 & Thomasboro Road	Carolina Shores
Forest Acres	Little River	Sea Mountain Highway	Horry County
Golden Estates	Little River	US 17	Horry County
Golfview Plantation	Little River	SC 9 & Sea Mountain Highway	Horry County
Graham Village	Little River	Hwy 1008	Horry County

Table 3-4. Study Area Subdivisions (continued)

Subdivision Name	Location	Location of Neighborhood Access	Jurisdiction
Graystone	Little River	US 17	Horry County
Green Acres	Little River	US 17	Horry County
Greenbriar	Brunswick County	NC 904	Brunswick County
Heartsease at Calabash	Calabash	Persimmon Road	Calabash
Heartsease at Shallotte	Shallotte	Bridgers Road	Shallotte
Heather Glen	Little River	US 17	Horry County
Heather Lakes	Little River	US 17	Horry County
Hidden Brooke	Little River	Pecan Street (Sea Mountain Highway)	Horry County
Hidden Lakes Village	Little River	Horseshoe Road (US 17)	Horry County
Kingsport	Little River	US 17	Horry County
Kinlaw	Little River	SC 90	Horry County
Lafayette Park	Little River	S-111	Horry County
Lakewood Estates	Shallotte	Ocean Isle Beach Road	Brunswick County
Lighthouse Cove	Calabash	Thomasboro Road	Carolina Shores
Lightkeepers Village	Little River	SC 90/US 17	Horry County
Little River Estates	Little River	SC 90	Horry County
Little River Farms	Calabash	Ash Little River Road	Brunswick County
Little River Golf & Health Resort	Little River	US 17	Horry County
Little River Heights	Little River	US 17	Horry County
Luck & Ellis Lots	Little River	US 17	Horry County
Lynndale Apartments	Ocean Isle Beach	Seaside Road (NC 904)	Brunswick County
Mallard Pointe & Mallard Creek	Little River	Horseshoe Road (US 17)	Horry County
Mariner's Pointe	Little River	US 17	Horry County
Marshfield	Little River	Sea Mountain Highway	Horry County
Meadowlands[2]	Calabash	Shingletree Rd & Calabash Rd	Brunswick County
Mosetown	Little River	S-111 & Mineola Avenue	Horry County
Neptune Acres	Little River	SC 9	Horry County
Newport Village	Little River	McCorsley Avenue (US 17)	Horry County
North Pointe	Little River	Hwy 1008	Horry County
North Village	Loris	S-57	Horry County
Oak Grove	Little River	Ellis Drive (US 17)	Horry County

Table 3-4. Study Area Subdivisions (continued)

Subdivision Name	Location	Location of Neighborhood Access	Jurisdiction
Oak View	Little River	Mineola Avenue	Horry County
Oaks, The	Little River	Lakeside Drive (US 17)	Horry County
Ocean Forest	Carolina Shores	Calabash Road	Carolina Shores
Ocean Ridge Plantation[2]	Ocean Isle Beach	US 17, Seaside Road (NC 904) & Old Georgetown Road	Brunswick County
Ocean Side Place	Carolina Shores	Calabash Road	Carolina Shores
Old Tram Village	Little River	S-111	Horry County
Olde Harbour	Little River	SC 9	Horry County
Palm Lakes Plantation	Loris	S-57	Horry County
Palmetto Greens	Loris	S-57	Horry County
Parkway Townhouses	Little River	Sea Mountain Highway	Horry County
Patriot Point	Loris	S-57	Horry County
Pine Crest	Carolina Shores	Shingletree Road	Carolina Shores
Pine Ere Acres	Little River	Mineola Avenue	Horry County
Pinebrook at Bay Tree	Little River	US 17	Horry County
Pinewood Court	Little River	Horseshoe Road (US 17)	Horry County
Plantation Pines	Loris	SC 9	Horry County
Planters Green	Sunset Beach	US 17	Brunswick County
The Preserve at Little River	Little River	SC 9	Horry County
Princeton Place	Little River	SC 90	Horry County
Ravenwood	Little River	Horseshoe Road (US 17)	Horry County
Retreat, The	Little River	S-57	Horry County
Richland Marsh	Little River	Bayshore Drive (US 17)	Horry County
River Hills[2]	Little River	US 17	Horry County
River Oaks Village	Little River	US 17	Horry County
River View Heights	Little River	Waterfront Avenue (US 17)	Horry County
Riverbrook	Little River	Waterfront Avenue (US 17)	Horry County
Rivergate	Little River	US 17	Horry County
Rum Bluff	Loris	SC 9	Horry County
Salt Marsh Cove	Little River	Watson Avenue (US 17)	Horry County
Saltaire Village	Calabash	Persimmon Road	Calabash
Sandpiper Bay[2]	Sunset Beach	Old Georgetown Road	Sunset Beach
Savannah Lakes	Calabash	Shingletree Road	Carolina Shores
Shallotte Manor Apartments	Shallotte	NC 130	Shallotte

Table 3-4. Study Area Subdivisions (continued)

Subdivision Name	Location	Location of Neighborhood Access	Jurisdiction
Shepherd's Cove	Little River	Bayshore Drive (US 17)	Horry County
Shingletree Acres	Calabash	Shingletree Road	Carolina Shores
Small Woods	Little River	Lakeside Drive (US 17)	Horry County
The Spa At Little River	Little River	US 17	Horry County
Spinnaker Bay	Little River	US 17	Horry County
Springmill Plantation	Calabash	McLamb Road & Calabash Road	Brunswick County
Starboard Knoll	Brunswick County	Old Shallotte Road	Brunswick County
Stone's Edge	Loris	S-57	Horry County
Sun Colony	Loris	SC 9	Horry County
Sunset Landing[1]	Loris	S-57	Horry County
Tall Pines Plantation	Ocean Isle Beach	US 17	Brunswick County
Townhomes on Shellbank	Loris	S-57	Horry County
Triston Place	Little River	McCorsley Avenue (US 17)	Horry County
Tullamore Lakes	Loris	SC 9	Horry County
Twisted Oaks	Little River	Nelson Road (US 17)	Horry County
Tybre Downs	Little River	Horseshoe Road (US 17)	Horry County
Union Village	Shallotte	Old Shallotte Road	Brunswick County
Village at Bay Tree Mobile Home Park	Little River	SC 9	Horry County
Village at Calabash	Calabash	Thomasboro Road	Carolina Shores
Village at Little River	Little River	Baldwin Avenue (US 17)	Horry County
Villas at Shingletree	Carolina Shores	Shingletree Road	Carolina Shores
Waterway Cove	Little River	US 17	Horry County
Whispering Woods	Little River	Rivergate Lane (US 17)	Horry County
Wildwood Village[1]	Shallotte	Wildwood Street (US 17)	Shallotte
Willard	Little River	Sea Mountain Highway & SC 90	Horry County
Windjammer Village	Little River	SC 179	Horry County
Windsong at Little River	Little River	Mineola Avenue	Horry County
Woodhollow	Little River	Bessent Avenue (US 17)	Horry County
Woodridge	Little River	Mineola Avenue	Horry County
Wrens Crossing	Little River	Horseshoe Road (US 17)	Horry County
Yacht Club at Lightkeepers Village	Little River	SC 90/US 17	Horry County

[1]Existing subdivision with visible construction activity based on a review of 2025 aerial photography of the project area.
[2]Golf course community.

Many of the existing subdivisions are the result of widespread recent development activity that has occurred throughout much of the Horry County portion of the study area, as well as in areas south of Hickman Road and US 17 in Brunswick County. One of the existing subdivisions still under development is Bridgewater, which is a large, multi-phase mixed-use developments currently under construction in Little River. It is located on the east side of SC 9 at the site of the former Bay Tree Golf Course, just north of the existing US 17/SC 9 interchange. Bridgewater is planned to include commercial, single family, and multi-family residential. The commercial development is located on the portion of the development's property adjacent to SC 9.

3.2 Land Use and Transportation Planning

3.2.1 Land Use Plans

There are multiple local jurisdictions within the project study area. In South Carolina, the only local jurisdiction within the study area is Horry County, although the city limits of the City of North Myrtle Beach extend to the south side of the Atlantic Intracoastal Waterway adjacent to the southwestern corner of the study area. In North Carolina, the local jurisdictions within the study are Brunswick County, the Town of Carolina Shores, and the Town of Shallotte. The Towns of Calabash, Sunset Beach, and Ocean Isle Beach are located just to the south of the study area boundary.

3.2.1.1 Existing Land Use

Existing land use in the Horry County portion of the study area can be grouped into relatively distinct areas based on similarity of existing development and observed activities. The US 17 and SC 9 corridors are characterized by relatively dense development and contain a wide mix of uses that have been developed incrementally over a long period of time. Existing uses include residential subdivisions of varying densities that are similar in age, commercial, industrial, service-oriented, institutional, and recreational uses. The US 17 corridor through Little River is the most densely developed part of the study area. The only recent development activity on the SC 9 corridor is Seacoast Medical Center located just west of the US 17 interchange.

The area north of SC 9 and south of Little River Road (S-111) contains predominantly residential existing land uses that include a mix of more recently developed subdivisions and older single-family homes, as well as intermittent commercial, institutional (primarily churches), and light industrial uses clustered near intersections. Subdivision development in this area is clustered along Wampee Road (S-57) and Little River Road and tends to be moderate to moderately large in size. The majority of all recent development activity in this area tends to include residential subdivisions constructed in the past ten to 15 years. Several of the residential subdivisions in the area to the south of Little River Road include golf courses.

Between Little River Road and the North Carolina State Line, agriculture is the predominant existing land use with intermittent single family residential. The overall development pattern is noticeably lower in density and more modest in nature. The Mineola Avenue (S-50) corridor has a residential-agriculture pattern that is moderately low density and more in kind with the residential pattern across the state line in Brunswick County.

Most of the study area within Brunswick County lies within the county's unincorporated jurisdiction. The dominant existing land uses within the unincorporated areas are agriculture, low-density rural residential, and undeveloped forested areas. Much of the unincorporated land located west of the US 17 corridor is in agricultural use or is environmentally sensitive undeveloped land (e.g., floodplain and wetlands along streams and swamps). However, there are several large residential subdivisions along the Hickman Road corridor, some of which are golf course communities. There are also a number of family estates and large and small farming operations. A notable portion of the total land area west of US 17 is also actively managed for timber, some of which is under ownership by corporate timber farms. There are also intermittent commercial, office and institutional, and industrial uses, which generally are located along the US 17, NC 904, and Hickman Road corridors.

The Town of Carolina Shores is located just north of the South Carolina State Line, predominantly to the south of US 17, but the Town's extraterritorial jurisdiction (ETJ) extends north from US 17 toward Hickman Road. Existing land use within the Town's jurisdiction is largely comprised of residential subdivisions, several of which are golf course communities.

The northern portion of the study area is within the Town of Shallotte. Existing land use in the Shallotte portion of the study area is primarily commercial and institutional (along the US 17, US 17 Business, and NC 130 corridors), low-density residential, and agricultural.

3.2.1.2 Zoning Characteristics

Zoning regulations are in place for the proposed Carolina Bays Parkway Extension study area in unincorporated areas in both Horry County, South Carolina and Brunswick County, North Carolina. Zoning maps for the local jurisdictions within the study area are included in the *Community Characteristics Report* (CALYX Engineers, 2018).

The Horry County Code of Ordinances establishes regulations applying to all land development activities in the unincorporated portions of Horry County, including minimum design standards for new development as well as zoning classifications for land use. In addition to the standard zoning classifications, the Horry County Code identifies several overlay zones, including the Little River Overlay Zone. The Little River Overlay Zone boundary includes the area extending 250 feet to the east and west of the US 17 right-of-way lines between the North Carolina state line and the SC 9 interchange. The Little River Overlay Zone was established to provide standards relative to accessibility, appearance, and safety in the development of commercial, industrial, multi-family residential, and office projects. Furthermore, the overlay is established to provide unified development that promotes a sense of place and provides opportunities to develop projects to be compatible with the carrying capacity of an urban corridor. Land in the Horry County portion of the study area is largely zoned for various types of planned residential developments and low-density residential/agricultural/forestry, with the exception of the US 17, SC 9, and SC 90 corridors which are zoned highway commercial.

The Brunswick County Unified Development Ordinance establishes design guidelines, administrative procedures as well as the process for enforcement of construction and development activity guidelines within the Brunswick County jurisdictional boundary. Land in the unincorporated Brunswick County portions of the study area is largely zoned for medium (in the vicinity of the US 17 corridor) to low (areas further to the north) density residential development, with the exception of much of the land adjacent to the US 17 corridor, which is zoned commercial low density. There is a large high density residential

zoning district that covers the existing Brunswick Plantation subdivision, as well as some adjacent areas along the north side of No. 5 School Road.

The study area also includes areas that are within the zoning jurisdictions of the Towns of Carolina Shores and Shallotte. Most of the land within the study area that is within the Town of Carolina Shores' zoning jurisdiction is zoned for residential uses. However, much of the US 17 corridor is zoned highway commercial. There are also areas zoned for commercial and industrial uses in vicinity of the US 17/ Calabash Road/Country Club Drive intersection, as well as areas zoned agricultural, in particular on the north side of US 17 near Shingletree Road.

The Town of Shallotte jurisdictional areas within the study area are zoned primarily for commercial and residential uses. Commercial zoning areas are concentrated along US 17, NC 130, and US 17 Business. Residential agriculture and low-density single family residential classifications generally cover the areas in between.

Brunswick County adopted a Voluntary Agricultural Districts (VAD) Ordinance in 2001. The Brunswick County Agricultural Advisory Board implements the provisions of the VAD Ordinance. There are currently 99 farms within the study area in Brunswick County that participate in the VAD program. VAD parcels within the study area are shown on Figure 20, and VADs are discussed further in Section 3.3.3.3.

3.2.1.3 Coastal Barrier Resources System

The Coastal Barrier Resources Act (CBRA) withdraws Federal assistance for infrastructure in areas deemed "undeveloped" in 1982. The Federal government no longer can provide financial assistance for new infrastructure in Coastal Barrier Resources System (CBRS) areas. Specifically, the act prohibits Federal expenditures for buildings, airports, roads, bridges, causeways, piers, jetties, seawalls, water supply systems, and utility lines within the CBRS. There are no CBRS units within the project study area.

3.2.1.4 Future Land Use

Horry County's *Imagine 2040 Comprehensive Plan* (2040 Plan) (December 2019) was developed to guide government officials and citizens decision-making in the effective management of the county's economic, natural, and cultural resources in light of the rapid growth and change that is occurring. The plan addresses the nine elements that every comprehensive plan in South Carolina is required to address: population, housing, economic, community facilities, natural resources, cultural resources, land use, transportation, and priority investments. The 2040 Plan notes that Horry County's population has more than doubled in the last 30 years, and that in 2018 the US Census identified the County as part of the second fastest growing metropolitan statistical area in the nation for the third year in a row. Rapid population growth has consisted largely of residential subdivisions in unincorporated areas of Horry County that are not densely developed and are without easy access to commercial services. The 2040 Plan's land use chapter defines a future growth strategy that emphasizes the principles of sustainable development, efficiently expanding public infrastructure and services, and bringing people closer to job centers. It encourages thoughtful development and redevelopment in existing urban centers. The entire South Carolina portion of the study area is included within the 2040 Plan's boundaries.

The 2040 Plan's Planned Road Projects map shows the Carolina Bays Parkway Extension running parallel to and just east of Wampee Road from US 17 to the North Carolina State Line. The northward extension

of the Carolina Bays Parkway to US 17 on the north side of Shallotte is identified as one of the essential currently planned roadway projects for providing better national connectivity to the Grand Strand region, "thus providing not only long-term stability to its tourism economy, but also providing a vital prerequisite for achieving necessary economic diversification and job creation within this labor market." The 2040 Plan also discusses the importance of these planned projects in helping to alleviate congestion on highways throughout the region. According to the plan's Future Land Use map, most of the land between the proposed Carolina Bays Parkway Extension and US 17, to the north of SC 9, is classified as suburban, but the northwestern portion of this area is classified as rural communities. The narrow strip of land between the Carolina Bays Parkway Extension and Wampee Road is classified as rural. Between Wampee Road and the extensive scenic and conservation area along the Waccamaw River, the area to the north of SC 9 is classified as suburban, followed by an area classified as rural communities in the vicinity of Little River Road, and then an area classified as rural adjacent to the state line.

The *Highway 57 and Highway 9 Area Plan* (December 2003) establishes guidelines to help manage growth and guide development in the area surrounding the SC 9/S-57 intersection. The intent of the plan is to identify areas most suitable for commercial, industrial and residential land uses within the plan area, which extends for a total radius of one and one-half miles from the intersection. The plan states its development was in response to completion of the northern section of the Carolina Bays Parkway (SC 31), which increased the potential for development in the area by increasing accessibility to the SC 9/S-57 intersection. Much of the area covered by the plan is within the project study area. Retail business is the primary recommended land use along major roadway corridors in the plan area (i.e., S-57, SC 9, and SC 31). Some institutional is recommended, which generally includes the area currently occupied by the North Strand Recreation Center. Some pockets of light industry are also recommended, primarily within the core area surrounding the SC 9/S-57 intersection. Low and medium density residential are recommended in the remaining areas.

Brunswick County, the Town of Carolina Shores, and the Town of Shallotte participate in the cooperative state-local North Carolina Coastal Area Management Act (CAMA) program. NC CAMA requires local governments within the 20 coastal counties to prepare land use plans which provide a balance of protection, preservation, and orderly development.

The *Brunswick County CAMA Core Land Use Plan* (2007) was adopted by the Brunswick County Board of Commissioners on October 15, 2007, and certified by the North Carolina Coastal Resources Commission (CRC) on November 30, 2007. The plan provides guidance for both individual projects and a broad range of policy issues, such as the development of regulatory ordinances and public investment programs. It provides an analysis of the existing and emerging issues related to population, housing, economy, natural systems, land use, community facilities, and related resources. The plan area includes the majority of the Brunswick County portion of the study area. The Brunswick County plan indicates that based on surveys among residents of the plan area, the key issues confronting the County are: scattered and sprawling large lot subdivision activity; unplanned commercial strip development; sewage problems; and concern with stormwater runoff and drainage.

The Existing Land Use Map for the plan area shows predominantly vacant, low density residential and agricultural land uses within the Brunswick County portion of the study area. Other intermittent land uses within the study area include commercial, office and institutional, recreational, single family residential, and industrial. These land uses generally occur along the US 17 and Hickman Road corridor area. In discussing existing land use trends, the plan highlights the substantial stock of vacant, agricultural, or otherwise undeveloped land county-wide, as well as the abundance of environmentally

sensitive areas. The plan identifies the most rapidly developing portion of the county as the area south of US 17 between the municipalities of Carolina Shores and Bolivia, an area which includes a portion of the study area. The plan states there are several large golf course communities and planned residential developments located in the area, noting this type of development is occurring at an especially rapid rate between the South Carolina State Line and Shallotte where development pressure is stemming from the Myrtle Beach/Grand Strand Area. The plan further states that large development companies have already targeted this region south of US 17 for the development of additional large scale mixed use subdivisions once the county's infrastructure develops sufficiently to support the growth. As a result of inexpensive land and a continually increasing population, the majority of future development is expected to be concentrated along the US 17 corridor.

The Future Land Use Map designates the Brunswick County portion of the study area as predominately low density residential with limited commercial and industrial uses along US 17 and other major road corridors. Conservation is the predominant future use along the Waccamaw River in the northwestern part of the study area. The plan recommends future land use policies that consolidate development and encourage smart growth principles.

The Brunswick County Planning and Parks and Recreation Departments developed a joint project called *Blueprint Brunswick 2040* that created two new plans: an updated Comprehensive Land Use Plan and a Parks and Recreation Master Plan. The *Blueprint Brunswick CAMA Land Use Plan* (2040) was adopted by the Brunswick County Board of Commissioners on February 20, 2023. The 2040 comprehensive land use plan serves as an update to the County's 2007 CAMA Core Land Use Plan.

These plans are intended to guide future growth, decisions, investments in infrastructure, and services within Brunswick County. The Brunswick Today component of the plan (Section 2) presents the existing conditions, trends, issues, and opportunities for the area, and also includes maps showing existing land use, protected areas, and land value, as well as residential development patterns and undeveloped land. The Goals and Objectives focus on land use compatibility and growth management, environmental conservation, infrastructure and transportation to accommodate future growth, the preservation of historic and cultural areas, economic development, placemaking, health and well-being, and governmental coordination.

The infrastructure carrying capacity goal notes Brunswick County will provide an infrastructure system that meets its citizens' present and future needs, supports a vibrant economy, protects the environment, and adds to the overall quality of life. Through a network of roadways, some freight rail service, public transportation (provided by Brunswick Transit System), bicycle/pedestrian routes, ferry systems, and airports people and products are transported within the county. The plan indicates that a few areas with roadway transportation challenges include: the southern portion of the US 17 (Ocean Highway) corridor within potential areas of the Carolina Bays Parkway Extension; NC 211 (Southport-Supply Road) from its intersection with US 17 to Southport; and those related to growth and circulation in the northern end of the county in and around US 17 and NC 133. These and other areas are targeted on the NCDOT project development listing for Brunswick County, which is a statewide competitive process.

The Transportation section of the *Blueprint Brunswick CAMA Land Use Plan* notes the top transportation goal is to support the implementation of the September 2022 *Draft Brunswick County Comprehensive Transportation Plan* (Draft CTP) (see Section 3.2.2.1). This includes promoting improvements to the road network by supporting specific projects recommended in the Draft CTP, including the extension of the

Carolina Bays Parkway to I-140. Additionally, it involves considering the proposed projects of NCDOT (i.e., STIP), the Wilmington Urban Area Metropolitan Planning Organization (WMPO) area, the Cape Fear Rural Transportation Planning Organization (Cape Fear RPO) area, and the GSATS MPO area. The *Blueprint Brunswick CAMA Land Use Plan* notes a future US 17 Corridor Study should be considered after the general alignment of the Carolina Bays Parkway Extension has been determined.

The *Blueprint Brunswick CAMA Land Use Plan* includes a Future Land Use and Conservation Map, which illustrates the future development pattern envisioned by the community. It represents the culmination of ideas and input received throughout the planning process tempered with market realities, the constraints of the environmental conditions and infrastructure availability, and other factors affecting the suitability of land for various uses. The map shows a Neighborhood Center near the Ash Little River Road/No. 5 School Road intersection and a Community Center is shown at Grissettown (NC 904/Old Shallotte Road intersection). Medium Density Residential – Mixed is proposed in the areas surrounding these centers. Open Space Conservation and Rural Agriculture are the primary uses proposed with medium and low density residential throughout the study area.

The *Carolina Shores CAMA Comprehensive Plan* was adopted by the Carolina Shores Board of Commissioners on July 12, 2018, but has not been certified by the North Carolina CRC. The plan outlines existing conditions in the Town and provides goals and recommendations for what it would like to be in the future. The plan also provides the legal basis for land use regulations and meets the North Carolina CAMA requirements. Goals and strategies developed as part of the plan are based on community concerns and desired outcomes. One concern in particular is the impact the proposed Carolina Bays Parkway Extension will have on the Town of Carolina Shores. The eight goals developed for the plan focus on creating a sense of community while providing needed services and facilities. The Community Profile section of the plan discusses the growing population and housing stock concentrated along the coast and in Brunswick County.

A portion of the Town's municipal limits and ETJ are within the study area on both sides of existing US 17 to the north of the South Carolina border. The primary existing land use for developed land in Carolina Shores is single-family residential, but there is a large amount of vacant/unimproved lands and wetlands. The Carolina Bays Parkway is mentioned as a significant regional transportation improvement that will have a direct impact on the timing of development throughout the Town's planning jurisdiction, depending on the selected route, but overall development is expected to be similar whether the project is built or not. The plan states that the Town will continue to monitor this project and will conduct all necessary corridor and small area planning once the final plans have been certified by NCDOT.

The Future Land Use section of the plan discusses future land use categories and connects each land use category to existing zoning districts. It emphasizes that the Town of Carolina Shores Unified Development Ordinance will require some revisions to fully implement the proposed land use categories. Commercial, Office/Institutional, Industrial, Mixed-Use, High, Medium, and Low Density Residential, and Conservation future land uses are recommended throughout the Town. Residential uses make up most of the future land uses in the Carolina Shores planning area (67 percent of total acreage), the majority of which is Medium Density. Commercial future land uses are scattered along the US 17 corridor. Approximately eight percent of acreage is proposed Mixed Use, located along US 17 near Persimmon Road and Shingletree Road.

The *Town of Shallotte, NC: 2018 Land Use Plan* was adopted by the Shallotte Board of Aldermen on February 8, 2018, but has not been certified by the North Carolina CRC. The plan provides a blueprint for

growth and development over the next 20 to 30 years. Policies and recommendations of the plan emphasize preserving existing residential and natural resources while promoting economic growth and supporting downtown revitalization. The Town of Shallotte is estimated to grow by another 3,000 residents in the next 30 years. As a commercial hub of southwestern Brunswick County, this produces traffic congestion during the summer tourist months especially. The plan states many of the area roadways are at or over traffic carrying capacity and recommends several transportation improvements for area roadways, ranging from the construction of new roads to roadway improvements aimed at improving traffic congestion and providing alternative routes around the downtown district.

The portion of the study area surrounding the US 17 Bypass/NC 130 interchange is within the Shallotte municipal limits. Existing land uses in this area include vacant, commercial, office and institutional, and multi-family residential, with an apartment complex, hotel, restaurants, and big box retailers present. The Town's ETJ along US 17 Bypass extends to the west towards the US 17 Business/Old Shallotte Road intersection, but the commercial areas adjacent to the intersection, as well as the residential development along Wildwood Street to the north, are within the Town's municipal limits. Existing land uses in the vicinity of the US 17 Bypass/US 17 Business intersection include public/semi-public, recreational, multi-family, and vacant uses. Riverine Swamp Forest and managed pineland are environmental areas noted. Lookout Branch stream flows through the vacant area south of the US 17 Bypass/NC 130 interchange. The Future Land Use Classification Map proposes General Commercial at the US 17 Bypass/NC 130 interchange, extending northeast along US 17 Bypass. Medium Density Residential is proposed south of NC 130 and surrounding the Shallotte Township Park. Commercial and High Density Residential are future land uses shown at the US 17 Bypass/US 17 Business intersection.

There are numerous recently approved developments, predominantly residential, within the Carolina Bays Parkway Extension study area in both North Carolina and South Carolina. The 36 approved developments in the vicinity of the corridors for the Detailed Study Alternatives are listed in Table 3-5 and shown on Figure 19. Based on a review of 2025 aerial photography of the project area, many of these approved developments are already under construction, as noted in Table 3-5.

Table 3-5. Approved Developments

Subdivision Name	Location	Size of Development (acres)	Development Type (Approved Units)
Allston Park*	Brunswick County	63	Residential Subdivision (132 single family)
Anderson Tract*	Brunswick County	58	Residential Subdivision (336 townhomes)
Apple Tree Lane	Little River	31	Residential Subdivision (26 multi-family, 61 single family)
AXETZ PDD	Little River	10	Residential Subdivision (58 multi-family)
Calabash Palms*	Brunswick County	10	Residential Subdivision (69 townhomes)
Calabash Station*	Brunswick County	93	Residential Subdivision (251 single family)
Coastal Club of the Carolinas*	Brunswick County	311	Residential Subdivision (630 single family, 144 townhomes)

Table 3-5. Approved Developments (continued)

Subdivision Name	Location	Size of Development (acres)	Development Type (Approved Units)
Courtyards by Carrell*	Brunswick County	22	Residential Subdivision (66 single family)
Duke at Myrtle Beach	Little River	19	Condominiums (280 multi-family)
Farmstead*	Little River	174	Residential Subdivision (134 single family, 315 multi-family)
Forest View Townhomes	Brunswick County	23	Residential Subdivision (107 townhomes)
Fox Hollow	Brunswick County	77	Residential Subdivision (166 single family)
Glendale Arbor*	Brunswick County	138	Residential Subdivision (173 single family)
Gore Estates	Little River	23	Residential Subdivision (224 multi-family)
The Grove*	Little River	12	Residential Subdivision (61 single family)
Hardee Tract*	Brunswick County	50	Residential Subdivision (146 single family, 54 townhomes)
Hickman Branch Townhomes*	Brunswick County	71	Residential Subdivision (316 townhomes)
Hickman Farms	Brunswick County	55	Residential Subdivision (216 townhomes)
Hickman's Crossing*	Brunswick County	17	Residential Subdivision (68 single family)
Highway 17 Mixed-Use	Brunswick County	67	Residential Subdivision (109 single family, 123 townhomes, 288 multi-family)
Long Farm	Brunswick County	17	Residential Subdivision (49 single family)
McLamb Farm*	Brunswick County	82	Residential Subdivision (319 single family)
Mossy Hill Townhomes	Brunswick County	175	Residential Subdivision (592 townhomes)
Norris Farm	Brunswick County	109	Residential Subdivision (304 single family)
Osprey Isle*	Brunswick County	157	Residential Subdivision (81 single family, 264 townhomes)
Pea Landing Tract	Brunswick County	29	Residential Subdivision (85 single family)
Price Tract	Brunswick County	82	Residential Subdivision (164 single family, 22 townhomes)

Table 3-5. Approved Developments (continued)

Subdivision Name	Location	Size of Development (acres)	Development Type (Approved Units)
Rich Square at Brunswick Plantation*	Brunswick County	82	Residential Subdivision (319 single family)
Russ Tract	Brunswick County	55	Residential Subdivision (112 single family, 180 townhomes)
Rye Pint Townhomes	Brunswick County	66	Residential Subdivision (176 townhomes)
Seaside Palms*	Brunswick County	32	Residential Subdivision (104 single family)
Sterling Oaks, Supsura Tract*	Brunswick County	76	Residential Subdivision (338 single family)
Stone Farm*	Brunswick County	1,009	Mixed-Use Subdivision (1,796 single family, 363 townhomes, and approximately 45 acres of commercial space)
Sunrise Cove*	Brunswick County	40	Residential Subdivision (174 single family)
Timber Farms*	Brunswick County	850	Residential Subdivision (1,700 single family, 300 townhomes, 500 multi-family)
Trest Tract*	Brunswick County	34	Residential Subdivision (182 townhomes)

*Approved developments with visible construction activity based on a review of 2025 aerial photography of the project area.

In addition to these approved residential subdivisions, three of the existing residential subdivisions in the study area listed in Table 3-4 (Bridgewater, Sunset Landing, and Wildwood Village) are not completely built-out. There are also some vacant single-family residential lots available in the existing subdivisions for future development.

3.2.2 Transportation Plans

3.2.2.1 Highway Plans

There are several local transportation plans that include portions of the study area:

- The GSATS MPO *2040 Metropolitan Transportation Plan Update* (2017) indicates that the Carolina Bays Parkway Extension to US 17 in North Carolina is a committed project that is partially funded as part of the Horry County Road Improvement and Development Effort (RIDE) III referendum. The Plan Update also includes the proposed project in its lists of new construction recommendations for both the South Carolina and the North Carolina portions of the GSATS boundary. The recommended projects form the basis for the eventual list of prioritized projects selected for funding. The Plan Update also indicates that the North Carolina portion of the Carolina Bays Parkway Extension is a current roadway project in the NCDOT STIP, although the proposed project is unfunded in the NCDOT 2024-2033 STIP. NCDOT will determine options for financing the proposed project in North Carolina, and the financial plan will be included in the Final Environmental Impact Statement (FEIS).

- The September 2022 *Draft Brunswick County Comprehensive Transportation Plan* (Draft CTP) lists the Carolina Bays Parkway Extension from the South Carolina State Line to US 17 at NC 130 as its number one priority highway recommendation. The Draft CTP indicates the proposed project is the construction of a new six-lane freeway extending from the Carolina Bays Parkway to the US 17 Shallotte Bypass. (Note that as discussed in Chapter 2 of this DEIS, the Brunswick County portion of the proposed Carolina Bays Parkway Extension is recommended to be a four-lane facility based on forecast 2045 design year traffic volumes.) The Draft CTP shows the proposed project on approximately the same alignment as Alternative 1A. The Draft CTP also indicates the proposed project was submitted to SPOT 5.0 and SPOT 6.0 and is included in the NCDOT STIP. According to the Draft CTP, the identified need for the project is to serve as a statewide mobility project that assists with improving the transportation network by enhancing mobility and connectivity for traffic moving in and through the study area. The project supports the Draft CTP goal to support growth through a transportation network that serves local, inter- and intra-regional accessibility and mobility needs for both people and goods. It also supports the Draft CTP objective to increase the accessibility and mobility of people and freight within the region and to other areas.
- The City of North Myrtle Beach *Northeast Area Transportation Plan* (2009) considers existing growth and development trends in the area in combination with planned future transportation projects, including the proposed Carolina Bays Parkway Extension.

There are several additional transportation improvement projects included in the NCDOT 2024-2033 STIP in the study area (Table 3-6). There are no additional projects included in the SCDOT 2024-2033 STIP in the study area. These planned and recently completed (i.e., W-5601GA and W-5703H) projects in North Carolina involving US 17 physical improvements are expected to help alleviate congestion and improve safety on US 17 at these intersections. However, it is expected that area roadways would not experience an appreciable increase in mobility in design year 2045, nor would connectivity be improved, with TSM physical improvements. Similarly, the recently completed Wampee Road (S-57)/Little River Road (S-111) intersection physical improvements (P038944) will improve traffic operations and safety in the vicinity of this intersection; however, it is expected that Wampee Road would not show an appreciable increase in capacity in the design year with these improvements. Future no-build traffic projections and traffic capacity analyses performed for the subject project assumed the R-5851 and R-5857 projects were constructed.

Table 3-6. NCDOT 2024-2033 STIP Projects in the Study Area

NCDOT STIP Project	Description	NCDOT STIP Schedule/ Current Status
B-5996	Replace Bridge No. 090126 on Ash-Little River Road (SR 1300) over Cawcaw Swamp.	Under construction
R-5851	Convert US 17/NC 904 intersection to Synchronized Street configuration.	Right-of-way – unfunded; Construction – unfunded
R-5857	Convert US 17/US 17 Business intersections (both south and north of Shallotte) to Synchronized Street configuration.	Right-of-way – 2023; Construction – 2026
U-5862*	Upgrade US 17/Smith Avenue intersection to interchange.	Right-of-way – 2028; Construction – 2030
U-6104	Upgrade US 17/US 17 Business (Main Street)/Old Shallotte Road intersection to interchange.	Right-of-way – unfunded; Construction – unfunded

*Project is located on US 17 Shallotte Bypass just east of the Carolina Bays Parkway Extension study area.

3.2.2.2 Transit Plans

The Waccamaw Regional Transportation Authority (Coast RTA) provides transit services in Horry and Georgetown Counties in South Carolina. Through Coast RTA a variety of public transportation options are available, including fixed bus routes, paratransit service, ADA service, and Coastal Carolina University shuttles. Coast RTA provides service up to North Myrtle Beach with the majority of routes serving Myrtle Beach and Conway. Currently, none of the Coast RTA fixed routes operate within the study area.

The Waccamaw Regional Transit & Coordination Plan (2014), an appendix of the South Carolina Multimodal Transportation Plan, identifies existing public transportation services, needs, and strategies for the next 20 years. The plan focuses primarily on the areas of Georgetown, Horry, and Williamsburg Counties that lie outside the GSATS MPO jurisdiction. As the Horry County portion of the study area is entirely within the GSATS planning boundary, the plan contains few goals and objectives which apply directly to the study area. A key transportation strategy presented in the plan is to coordinate the development of multimodal options for residents and visitors within the Myrtle Beach metropolitan area, including public transportation. The plan outlines existing transit options, presents coordination strategies, and identifies regional transportation needs and funding options. The Plan outlines the broad goal of enhancing and expanding existing transit services. Also, the goal to increase inter-agency coordination is outlined. This goal will likely produce greater coordination between GSATS and the Waccamaw Regional Council of Governments (COG) to coordinate future transit planning, which may impact transit services within the study area.

The transit element of the GSATS MPO *2040 Metropolitan Transportation Plan Update* (2017) indicates that systemwide ridership for Coast RTA has steadily increased in recent years. The Plan identifies a major transit need is to provide expanded services to an aging population. The Plan also proposes transit projects that are aimed at improving regional and local services and include multimodal facilities to support future transit growth. The GSATS Plan also states that the transit policy recommendations contained in the 2014 *Waccamaw Regional Transit & Coordination Plan* for the Waccamaw Regional COG are also relevant to the transit needs of the GSATS region.

The Brunswick Transit System (BTS) provides non-emergency transportation services to the general public of Brunswick County and, through contract, to human service agency clients in Brunswick County. However, BTS does not offer fixed route service.

The study area is not currently served by passenger rail service.

3.2.2.3 Bicycle/Pedestrian Plans

The proposed future bicycle/pedestrian facilities within the study area are based on the recommendations of several planning documents that include portions of the study area. Each of these planning documents are discussed below, with corresponding multi-use and paddle trail recommendations shown on Figure 19. Table 3-7 summarizes the existing and proposed bicycle and pedestrian facilities in the study area.

East Coast Greenway

The East Coast Greenway (ECG) is a developing trail system along the east coast of the United States that is envisioned to link many of the major cities between Canada and Key West via traffic-free greenways that are safe and accessible for people of all ages and abilities (Cape Fear COG, 2017).

Table 3-7. Existing and Proposed Bicycle and Pedestrian Facilities in the Study Area

Route	Limits	County	Description
SC 179	US 17 to NC 179 (North Carolina State Line)	Horry	**Proposed:** Improve and widen to multilane facility with multipurpose path
Mineola Avenue	Edgewood Drive to US 17	Horry	**Existing:** Sidewalk (east side of road only)
US 17	Indian Hill Rd to Lakeside Dr	Horry	**Existing:** Sidewalk (both sides of road)
Heather Glen, Wallace Drive, Logan Street	Subdivision	Horry	**Existing:** Sidewalk
Vereen Memorial Gardens	Vereen Memorial Gardens Road	Horry	**Existing:** Over 3 miles of walking trails **Proposed:** Official trailhead for the ECG to be added to the front parking area
SC 9	S-57 to US 17 interchange	Horry	**Proposed:** Access management improvements from S-57 to US 17 interchange; Incorporate bicycle and pedestrian facilities and median beautification
Sea Mountain Highway	SC 9 to study area boundary	Horry	**Proposed:** Widen; Improve alignment to two-lane undivided minor arterial standards, including bicycle and pedestrian amenities with turning pockets at major intersections
S-57	SC 9 to study area boundary	Horry	**Proposed:** Widen S-57 from SC 90 to SC 9 with bicycle and pedestrian amenities
Morgan Avenue; 6th Avenue North; SC 90; US 17; Baldwin Ave.; Watson Ave.; Water Front Ave.; Mineola Ave.; Riverview Drive; Lakeside Drive; NC 179	US 17 in Horry County to Lake Drive in Brunswick County	Horry, Brunswick	**Existing/Proposed:** East Coast Greenway (ECG) on road trails
Springmill Plantation Boulevard NW	McLamb Road to Calabash Road	Brunswick	**Existing:** Sidewalk (one side of road)
Meadowlands Trail	Calabash Road to golf club parking lots	Brunswick	**Existing:** Sidewalk (one side of road)
Persimmon Road SW (SR 1167)	US 17 to study area boundary	Brunswick	**Existing:** Identified local user bicycle route **Proposed:** Future multi-use trail; widen roadway from 2 lanes to 4-lane divided with paved shoulders
Carolina Shores Parkway	Persimmon Road SW to study area boundary	Brunswick	**Existing:** Identified local user bicycle route **Proposed:** Future multi-use trail
NC 904 (Seaside Road/ Longwood Road)	Old Shallotte Road to NC 179 (Beach Drive)	Brunswick	**Existing:** Identified local user bicycle route **Proposed:** Future multi-use trail; bicycle lanes and sidewalks on west side of street from Old Shallotte Road to NC 179; widen from 2-lane undivided roadway to 4-lane divided roadway with curb and gutter from US 17 to NC 179
Country Club Road/ Calabash Road/Ash Little River Road	Within project study area	Brunswick	**Existing:** Identified local user bicycle route **Proposed:** Future multi-use trail; regional on-road bicycle network

Table 3-7. Existing and Proposed Bicycle and Pedestrian Facilities in the Study Area (continued)

Route	Limits	County	Description
Russtown Road (SR 1315)	NC 904 to study area boundary	Brunswick	**Existing:** Identified local user bicycle route **Proposed:** Future multi-use trail
Old Shallotte Road (SR 1316)	NC 904 to US 17	Brunswick	**Existing:** Identified local user bicycle route **Proposed:** Future multi-use trail
Main Street (US 17 Business)	US 17 to study area boundary	Brunswick	**Existing:** Identified local user bicycle route **Proposed:** Future multi-use trail
McMilly Road (SR 1320)	Old Shallotte Road to NC 130 (Whiteville Road)	Brunswick	**Existing:** Identified local user bicycle route **Proposed:** Future multi-use trail
NC 130 (Whiteville Road)	Within study area	Brunswick	**Existing:** On road bicycle trail **Proposed:** Greenway; widen to a 4-lane facility from McMilly Road (SR 1320) to NC 179 to improve safety and traffic flow
Bridgers Road	NC 130 to study area boundary	Brunswick	**Proposed:** Bicycle Lane
Bridgers Road Extension	SR 1349 (Bridgers Rd) to US 17 Business (Main St)	Brunswick	**Proposed:** Construct a new 2-lane roadway extending from Bridgers Road to create a connection with US 17 Business (Main St)
Main Street/Bridger Road Extension Loop	US 17 Business to study area boundary	Brunswick	**Proposed:** Bicycle and pedestrian amenities along Main Street/Bridger Road Extension Loop

Sources: *Brunswick County Trail Plan*, *Draft Brunswick County Comprehensive Transportation Plan*, GSATS MPO *2040 Metropolitan Transportation Plan Update*, *Cape Fear Regional Bicycle Plan*, *Horry County Parks and Open Space Plan*, and Walk Bike North Carolina Bicycle Routes (ncdot.gov).

According to the 2017 *Cape Fear Regional Bicycle Plan*, over 30 percent of the route is already on traffic-free greenways, creating safe, accessible routes for people of all ages and abilities. The proposed ECG trail route passes through the study area in Horry County and continues just to the south of the study area in Brunswick County.

From south to north, the route follows US 17 from North Myrtle Beach through Little River to meet SC 179 at the northern edge of Horry County. The trail follows SC 179 across the state line into Brunswick County and continues along NC 179 and NC 179 Business (Beach Drive) from Calabash to Shallotte. While the proposed route is identified in local and regional plans for both counties, no portion of the identified route in the vicinity of the study area is currently in the form of a greenway trail or multi-use path. Some segments of the ECG pass along existing sidewalk, while other segments pass through gap areas where there is no existing pedestrian access.

The proposed segment of the ECG through the Horry County portion of the study area, which extends from SC 9 along US 17 and SC 179 through Little River to the state line, is included in the GSATS *2040 Metropolitan Transportation Plan Update* (October 2017). Currently, there are no completed sections of the ECG within Brunswick County. The ECG website reports that 25 percent of North Carolina's 372-mile spine route is currently on greenway trails. Current goals for the ECG in North Carolina include signing the route with ECG trail markers to raise awareness and enhance the trail experience, designating trails, supporting connections between existing greenway trails and gap areas, and hosting events.

Horry County Imagine 2040 Comprehensive Plan

Horry County's *Imagine 2040 Comprehensive Plan* (2019) includes information from the *Horry County Parks and Open Space Plan* and *Horry County Bicycle and Pedestrian Plan*. Chapter 8 of the 2040 Plan (Transportation Element) includes strategies to provide pedestrian and bicycle travel opportunities

along US 17 and Ocean Boulevard. It also indicates the need to incorporate safe bicycle and pedestrian facilities into future road projects, provide way-finding signage for cyclists and walkers, provide better pedestrian crossing of roadways, and provide regional connectivity via the ECG, described in the section above. The plan inventories existing infrastructure, identifying common barriers to shared facility use by bicycle, pedestrian, and motorist users in the County, including fragmented sidewalks, increasing traffic volumes, auto-oriented development, lack of signalized crossings, and underdeveloped facilities.

Policy recommendations made in the plan include incorporating pedestrian and bicycle facilities into design standards, providing more signalized crossings, and regional coordination of proposed projects. In Horry County, most existing bicycle and pedestrian facilities are located within incorporated municipalities, such as Aynor, Conway, Loris, Myrtle Beach, and North Myrtle Beach. Because most connections to major destinations rely on arterial roadways, the GSATS region has made it a policy to integrate bicycle and pedestrian facilities into all its road projects, whether the development of new roads or the widening of existing facilities.

The proposed roadway projects within the study area that include bicycle and pedestrian improvements are listed below and in Table 3-7:

- Improve and widen SC 179; incorporate a multipurpose path, as part of the ECG route.
- SC 9 access management improvements from S-57 to US 17 interchange; incorporate bicycle and pedestrian facilities, and median beautification.
- Widen Sea Mountain Highway from SC 9 to the Intracoastal Waterway bridge; and incorporate bicycle and pedestrian facilities.

Chapter 4 of the 2040 Plan (Natural Resources Element) addresses current demand for recreation facilities and highlights areas of Horry County to focus conservation efforts, accounting for future population growth and development trends. This element was developed to provide the mechanism for guiding natural resource conservation and development in a way that is compatible with the area's natural landscape. The element identifies the recreational assets in Horry County, along with future recreational needs of the County's growing population. The element provides goals and strategies to protect these resources and the benefits they provide. The only trails and greenways in the Natural Resources Element within the study area are trails located in Vereen Memorial Gardens and ECG, discussed above. Vereen Memorial Historical Gardens is located on 115 acres of forest and marshland in Little River. This passive park has over 3 miles of walking trails and boardwalks.

Draft Brunswick County Comprehensive Transportation Plan

The September 2022 *Draft Brunswick County Comprehensive Transportation Plan* (CTP) includes multimodal forms of transportation such as bicycle, pedestrian, and public transportation. Table 3-7 lists recommended bicycle and pedestrian projects within the study area from the Draft CTP.

Brunswick County Trail Plan

The *Brunswick County Trail Plan* (2017) consists of two maps, showing existing and proposed trails. The existing trails inventory represents all of the bicycle, pedestrian, multi-use, and paddling trail routes throughout the county, which are currently identified in existing local plans. The proposed trail inventory represents all of the existing routes in addition to newly proposed routes to improve the trail network linking communities with surrounding recreational amenities and natural resources throughout the county. The plan does not prioritize any routes in particular or outline a funding strategy for any of

the proposed routes. The trail plan was approved by the Brunswick County Board of Commissioners in March, 2017 and by many of the municipalities located in Brunswick County.

Trails shown on the existing map are designated routes for travel, typically along a roadway. The trail bicycle routes depicted require cyclists to share the road with vehicles. Existing off-road greenway style and more pedestrian-friendly facilities are limited to the Brunswick Forest Multi-Use Trail, the Brunswick Riverwalk at Belville, and the Carroll Street Bike Trail, which are not located within the study area. NC 130 is the only existing on-road bicycle trail depicted on the trails map and located within the study area. Several proposed/future trails are shown on the future trail map and located within the study area, including:

- Calabash Road and Ash Little River Road through the entire length of the study area.
- Country Club Road, Carolina Shores Parkway, Cleek Drive, and Persimmon Road to the south and east of US 17.
- NC 904 on either side of US 17, continuing along Russtown Road to the north of NC 904.
- Old Shallotte Road through the entire length of the study area, continuing along US 17 Business/ Main Street to the east of US 17.
- McMilly Road from Old Shallotte Road to NC 130.

In addition to recommended bicycle trails, the *Brunswick County Trails Plan* shows a recommended paddle trail along the entirety of Cawcaw Swamp within the study area. This Cawcaw Swamp paddle trail runs along this stream from its confluence with the Waccamaw River to the crossing of NC 904, where a proposed paddle trail access is located.

Brunswick County Greenway/Blueway Master Plan

A greenway/blueway master plan is being developed for Brunswick County to promote physical health through the interconnection of trails and paths in order to support increased pedestrian, bicycle, and paddling modes of travel. The effort began in 2016 and will provide recommendations for future trail route locations between neighborhoods, facilities such as parks and schools, and commercial areas across Brunswick County. A draft map of existing and proposed greenways and blueways developed as part of the master plan shows recommendations consistent with the *Brunswick County Trail Plan* within the study area. Additionally, the draft master plan map shows a proposed greenway along the entirety of NC 130 within the study area.

Cape Fear Regional Bicycle Plan

The *Cape Fear Regional Bicycle Plan* (2017) is a comprehensive regional planning document adopted by local governments in the region, including Brunswick County. It is a 30-year plan for improving bicycle infrastructure in southeastern North Carolina through improvements at the network level, as well as the policy and program levels. The regional plan area includes all of Brunswick, Columbus, New Hanover, and Pender counties, as well as portions of Bladen, Sampson, and Onslow counties.

The plan recognizes the region as a tourist destination with a seasonal flux in visitors that are often looking for recreational opportunities, which a regional bicycle network could satisfy while also providing local economic development opportunities to smaller inland communities. The vision is for bicycling to be a safe and accessible form of transportation and recreation for residents and visitors in the region, with key destinations served by well-connected bikeways that increase tourism and promote economic development. Existing bicycle routes are inventoried to include those identified in locally

adopted bicycle/pedestrian plans throughout the region, as well as routes used by local cyclists and advocacy groups.

The plan makes a number of recommendations to improve the network, which are prioritized into short-term and long-term facility improvements, as well as various program level recommendations that include regional wayfinding signage and public information campaigns about bicycle safety and regional route mapping. The plan also makes a range of policy-level recommendations, including: local adoption of Complete Streets Policies throughout the region; integration of bicycle-oriented design guidelines at the local level that support route connectivity and require certain bicycle facility accommodations in site and subdivision planning; and recommendations specifically targeting NCDOT design guidelines and project development procedures. Portions of the ECG and the NC 3 "Ports of Call" bicycle route from Southport to South Carolina are long-term vision projects.

GSATS MPO 2040 Metropolitan Transportation Plan Update

The GSATS MPO *2040 Metropolitan Transportation Plan Update* (2017) documents existing and proposed bicycle and pedestrian facilities within the GSATS region. The proposed facilities are primarily recommended within the urban areas. Existing and planned facilities shown within the study area include portions of the ECG, which will also provide a significant active transportation connection for bicyclists and pedestrians when fully implemented. Transportation projects with access management, streetscape, and complete streets recommendations within the study area are listed here and in Table 3-7:

- Project #42 in Horry County: SC 9 access management improvements from S-57 to US 17 interchange, including plantable median between intersections and bicycle and pedestrian facilities.
- Project #48 in Horry County: Improve alignments of Sea Mountain Highway (SC 9 to the Intracoastal Waterway bridge) to two-lane undivided minor arterial standards, including bicycle and pedestrian amenities with turning pockets at major intersections.
- Project #50 in Horry County: Widen S-57 from SC 90 to SC 9 with bicycle and pedestrian amenities.

3.3 Physical Environment Characteristics

3.3.1 Noise Characteristics and Noise Abatement Criteria

Noise is basically defined as unwanted sound. It is emitted from many sources including airplanes, factories, railroads, power generation plants, and highway vehicles. Highway noise, or traffic noise, is usually a composite of noises from engine exhaust, drive train, and tire-roadway interaction.

The magnitude of noise is usually described by its sound pressure. Since the range of sound pressure varies greatly, a logarithmic scale is used to relate sound pressures to some common reference level, usually the decibel (dB). Sound pressures described in decibels are called sound pressure levels and are often defined in terms of frequency-weighted scales (A, B, C, or D). The weighted-A decibel scale is used almost exclusively in vehicle noise measurements because it places the most emphasis on the frequency range to which the human ear is most sensitive (1,000-6,000 Hertz). Sound levels measured using a weighted-A decibel scale are often expressed as dBA. Examples of noise pressure levels in dBA are a jackhammer at 120 dBA, a garbage disposal at 80 dBA, a window air-conditioner at 60 dBA, and a dripping faucet at 30 dBA.

FHWA has developed Noise Abatement Criteria (NAC) and procedures to be used in the planning and design of highways to determine whether highway noise levels are or are not compatible with various land uses. These abatement criteria and procedures are set forth in Title 23 Code of Federal Regulations Part 772, *Procedures for Abatement of Highway Traffic Noise and Construction Noise* (23 CFR 772). Table 3-8 lists the FHWA NAC land use activity categories, as well as the noise levels that, when approached or exceeded with the project build condition, constitute an impact. The Leq, or equivalent sound level, is the level of constant sound which in a given situation and time period has the same energy as time varying sound. In other words, the fluctuating sound levels of traffic noise are represented in terms of a steady noise level with the same energy content.

Table 3-8. Noise Abatement Criteria

Noise Abatement Criteria (NAC) Hourly Equivalent A Weighted Sound Level (decibels dB(A)))			
Activity Category	**Activity Criteria[1] $L_{eq(h)}$[2]**	**Evaluation Location**	**Activity Description**
A	57	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B[3]	67	Exterior	Residential
C[3]	67	Exterior	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, daycare centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E[3]	72	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A to D or F.
F	N/A	N/A	Agriculture, airports, bus yards, emergency services, industrial, logging maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.
G	N/A	N/A	Undeveloped lands that are not permitted.

Source: Title 23 Code of Federal Regulations Part 772, *Procedures for Abatement of Highway Traffic Noise and Construction Noise*.
[1]The $L_{eq(h)}$ Activity Criteria values are for impact determination only, and are not design standards for noise abatement measures.
[2]The equivalent steady-state sound level which, in a stated period of time, contains the same acoustic energy as the time-varying sound level during the same time period, with $L_{eq(h)}$ being the hourly value of L_{eq}.
[3]Includes undeveloped lands permitted for this activity category.

A noise study was conducted to assess the potential traffic noise impacts of the proposed project. Details of the methodology and investigations are provided in the *Traffic Noise Report, Carolina Bays Parkway (STIP Project R-5876)* (Gannett Fleming, September 2023), appended by reference.

3.3.2 Air Quality

Air pollution originates from various sources. Emissions from industry and internal combustion engines are the most prevalent sources. The impact resulting from highway construction ranges from intensifying existing air pollution problems to improving the ambient air quality. Changing traffic patterns are a primary concern when determining the impact of a new highway facility or the improvement of an existing highway facility.

The Federal Clean Air Act of 1970 established the National Ambient Air Quality Standards (NAAQS). These standards were established in order to protect the public health, safety, and welfare from known or anticipated effects of air pollutants. The NAAQS contain criteria for sulfur dioxide (SO_2), particulate matter (PM_{10}, 10-micron and smaller; $PM_{2.5}$, 2.5- micron and smaller), carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), and lead (Pb).

The primary pollutants from motor vehicles are unburned hydrocarbons (HC), nitrogen oxides (NOx), carbon monoxide (CO), and particulates. HC and NOx can combine in a complex series of reactions catalyzed by sunlight to produce photochemical oxidants such as O_3 and NO_2. Because these reactions take place over a period of several hours, maximum concentrations of photochemical oxidants are often found far downwind of the precursor sources.

The proposed project is located in Brunswick County, North Carolina and Horry County, South Carolina, which have been determined to comply with the NAAQS. The proposed project is located in an attainment area; therefore, 40 CFR Parts 51 and 93 are not applicable. The proposed project is not expected to create any adverse effects on the air quality of this attainment area. The *Qualitative Air Quality Report, Carolina Bays Parkway Extension, from SC 9 to US 17 Shallotte Bypass* documents the project-level air quality analysis prepared for the proposed project.

In addition to the criteria air pollutants for which there are NAAQS, the US Environmental Protection Agency (USEPA) also regulates air toxics. USEPA identified nine compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers or contributors and non-cancer hazard contributors from the *2011 National Air Toxics Assessment* (NATA). These are 1,3-butadiene, acetaldehyde, acrolein, benzene, diesel particulate matter (diesel PM), ethylbenzene, formaldehyde, naphthalene, and polycyclic organic matter. FHWA considers these the priority mobile source air toxics (MSAT). Section 4.3.2 contains a more detailed discussion of MSAT.

3.3.3 Farmland

3.3.3.1 Farmland Soils

The Farmland Protection Policy Act of 1981 requires evaluation of farmland conversions to non-agricultural uses. In addition, North Carolina Executive Order Number 96, *Conservation of Prime Agricultural and Forest Lands,* requires all state agencies to consider the impact of land acquisition and construction projects on prime farmland soils, as designated by the Natural Resources Conservation Service (NRCS). Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, forage, oilseed, and other agricultural products within allowable soil erosion tolerance. Prime farmland does not include land already in or committed to urban development, transportation or water storage. Table 3-9 lists the prime and unique farmland soils in the

South Carolina and North Carolina portions of the study area. Prime and unique farmland soils in the study area are shown on Figure 20.

Table 3-9. Prime and Unique Farmland Soils in the Study Area

Soil Series	Mapping Unit	Rating
South Carolina		
Eulonia loamy fine sand (0 to 2 percent slopes)	EuA	All areas are prime farmland
Eulonia loamy fine sand (2 to 6 percent slopes)	EuB	All areas are prime farmland
Nansemond loamy fine sand (0 to 2 percent slopes)	NeA	All areas are prime farmland
Suffolk loamy fine sand (0 to 2 percent slopes)	SfA	All areas are prime farmland
Suffolk loamy fine sand (2 to 6 percent slopes)	SfB	All areas are prime farmland
Yauhannah fine sandy loam (0 to 2 percent slopes)	YaA	All areas are prime farmland
Yemassee loamy fine sand	Ye	Prime farmland if drained
North Carolina		
Goldsboro fine sandy loam (0 to 2 percent slopes)	GoA	All areas are prime farmland
Grifton fine sandy loam	Gt	Prime farmland if drained
Johns fine sandy loam	Jo	Prime farmland if drained
Leon fine sand	Lo	Farmland of unique importance
Lumbee fine sandy loam	Lu	Prime farmland if drained
Lynchburg fine sandy loam (0 to 2 percent slopes)	Ly	Prime farmland if drained
Murville mucky fine sand	Mu	Farmland of unique importance
Norfolk loamy fine sand (2 to 6 percent slopes)	NoB	All areas are prime farmland
Onslow fine sandy loam	On	All areas are prime farmland
Pantego mucky loam	Pn	Prime farmland if drained
Rains fine sandy loam (0 to 2 percent slopes)	Ra	Prime farmland if drained
Torhunta mucky fine sandy loam	To	Prime farmland if drained
Woodington fine sandy loam	Wo	Prime farmland if drained

3.3.3.2 Agricultural Resources

There are numerous agricultural operations and farmlands within the study area. It is the dominant land use in areas north of S-111 in Horry County, as well as in the unincorporated areas of Brunswick County, with particularly high concentrations in the areas north of existing US 17. In these areas where the overall agricultural activity is high, the overall development pattern is noticeably lower in density. There are a number of family farming operations, as well as a number of smaller farming operations. A notable portion of the total land area north of US 17 is managed for timber production, some of which is under ownership by corporate timber farms.

One notable agricultural resource within the study area is Indigo Farms. Indigo Farms is an active Century Farm, market, and agritourism operation with farm fields located in both North Carolina and South Carolina along S-57 (Wampee Road) and Hickman Road. A Century Farm is a farm that has been officially recognized by a regional program that has documentation that the farm has been continuously owned by a single family for 100 years or more. The Indigo Farms Produce Market and Garden Center is located on Hickman Road just inside the North Carolina State Line and sells a wide variety of local and non-local produce, as well as meats, cheeses, honey, and other specialty items. In addition to the produce market, Indigo Farms offers a range of agritourism experiences to farm visitors, including: parties by reservation; a barnyard with chickens, geese, goats, sheep and pigs; "farm life" and educational tours; pig races; seasonal "pick your own" berries and pumpkins; and various other seasonal farming events.

Additional agricultural resources within the study area include at least one permitted animal operation (swine) on the southern end of Old Shallotte Road in Brunswick County and several commercial plant nurseries and growing operations.

Based on the Census of Agriculture (United States Department of Agriculture, 2017), Brunswick County's main food and fiber crops produced include grains, vegetables, and greenhouse floriculture; the top livestock grown in Brunswick County includes hogs, horses, and cattle. Brunswick County consistently ranks first in the production of tomatoes and ninth in vegetables and fruit within the State of North Carolina. In Horry County, the main food and fiber crops produced include tobacco, grains, and hay; the top livestock grown in Horry County also includes pigs, horses, and cattle.

3.3.3.3 Voluntary Agricultural Districts

North Carolina's Farmland Preservation Enabling Act allows counties to adopt ordinances which provide for Voluntary Agricultural Districts (VADs), which provide property owners with a voluntary method to support the conservation and preservation of farmland from non-farm development. Properties under VAD protection have a conservation agreement between the property owner and the county that prohibits non-farm use or development for a period of at least ten years. There are currently 99 farms within the study area in Brunswick County that participate in the VAD program. VAD parcels within the Brunswick County portion of the study area are shown on Figure 20. South Carolina does not have any adopted legislation similar to North Carolina's Farmland Preservation Enabling Act, and there are no known agricultural properties within the Horry County portion of the study area that currently participate in other state or local farmland protection programs.

3.3.4 Utilities

The *Utility Tech Memo, Carolina Bays Parkway Extension Project, Brunswick County, NC & Horry County, SC* (STV, November 2023), appended by reference, documents information on utilities within the study area. Table 3-10 provides a list of the utility types by utility owners in the South Carolina and North Carolina portions of the study area, as well as a list of key utility facilities within the corridors for the Detailed Study Alternatives.

There are also five telecommunication towers within the study area in the following locations: north side of US 17 just east of NC 904; east side of Ash Little River Road just south of No. 5 School Road; west side of NC 904 just north of Russtown Road; south side of Hickman Road just east of Shingletree Road; and east side of US 17 just north of US 17 Business (Main Street).

Table 3-10. Utility Type by Utility Owners in the Study Area

Utility Type	Utility Owners	Key Utility Facilities within the Detailed Study Alternative Corridors
South Carolina		
Power	Horry Electric Cooperative	Substation east side of Wampee Road north of Northside Drive
	Santee Cooper	Substation southeast quadrant of SC 9/SC 31 interchange
Gas	Dominion Energy	N/A
Water and Sewer	Little River Water and Sewerage Company	10-inch water line parallel to Wampee Road; 12-inch water line parallel to Little River Road; 16-inch water line parallel to SC 9; 10-inch sewer force main parallel to Wampee Road; 12-inch sewer force main parallel to SC 9; water tower southeast quadrant of Wampee Road/Little River Road intersection
Telecommunications	AT&T Transmission	Transmission fiber line along Wampee Road
	Charter Communications	N/A
	Frontier Communications	Backbone fiber line parallel to SC 9
	Horry County	Backbone fiber line parallel to SC 9
	Horry Telephone	N/A
	Windstream Communications	N/A
North Carolina		
Power	Brunswick Electric Membership Corporation	Transmission and distribution lines parallel to US 17; substation south side of Hickman Road east of Shingletree Road
Gas	N/A	N/A
Water and Sewer	Brunswick County	20-inch and 24-inch water lines parallel to US 17; water pump station on Washington Road; 12-inch and 24-inch sewer force mains parallel to US 17; 14-inch sewer force main crossing US 17
	Town of Shallotte	12-inch water line crossing US 17 onto Washington Road
Telecommunications	AT&T Transmission	Transmission fiber line along Hickman Road
	Atlantic Telephone Membership Corporation	N/A
	Charter Communications	N/A
	Windstream Communications	Backbone fiber line parallel to US 17

3.3.5 Hazardous Materials

Hazardous material sites are regulated by the Resource Conservation Recovery Act (RCRA) and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Hazardous materials are generally defined as material or a combination of materials that present a potential hazard to human health or the environment.

A Phase I field investigation was conducted in August 2020 to identify geoenvironmental sites of concern. Geographic Information Systems data was also reviewed to identify known sites of concern in the study area. Sites of concern may include, but are not limited to, underground storage tank (UST) sites, above ground bulk storage tank (AST) sites, dry cleaning facilities, hazardous waste sites, regulated landfills, and unregulated dumpsites. A search of the appropriate environmental agencies' databases was performed to assist in evaluating identified sites. Thirty-three sites of concern were identified within the study area (see Figure 19). The sites identified include: six convenience stores/gas stations; ten automobile repair shops; three vacant properties; two properties owned by and within NCDOT right-of-way; and 12 miscellaneous active businesses. Eighteen sites were identified that either currently have petroleum USTs, or had them removed. Underground petroleum spills that are still being actively monitored for groundwater contamination occurred at three of these sites. Three sites with ASTs were also identified. No hazardous waste sites and no landfills were identified.

3.3.6 Mineral Resources

The North Carolina Division of Energy, Mineral and Land Resources lists five permitted active mines in the Brunswick County portion of the study area as of June 29, 2021. The five sites are permitted for sand and gravel operations and include: Simmons Mine (see Figure 19, Sheet 9), Benton Tract Sand Mine (see Figure 19, Sheet 6), Wilson Mine, J.P. Russ and Son Mine No. 2, and Old Shallotte Mine (see Figure 19, Sheet 9). The South Carolina Department of Health and Environmental Control does not list any permitted active mines in the Horry County portion of the study area.

3.3.7 Floodplains/Floodways

A floodway and floodplain evaluation was conducted in accordance with 23 CFR 650, Subpart A. Brunswick County, North Carolina and Horry County, South Carolina both participate in the National Flood Insurance Regulatory Program (NFIP) and portions of the study area in both counties are within the 100-year floodplain. The NFIP defines a floodplain as any land area susceptible to being inundated by water. A regulatory floodway is the channel of a river of other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water elevations more than a designated height.

In NFIP regular program communities, the Federal Emergency Management Agency (FEMA) has conducted detailed flood studies to determine designated floodways to safely remove floodwater during a flood event. These studies result in flood boundary and flood insurance mapping. These maps indicate the regulatory floodways and base (100-year) floodplains for the major watercourses. Limited detailed studies have also been conducted which determine designated floodplains. In the study area, these watercourses include: Cawcaw Swamp, Shingletree Swamp, Little Cawcaw Swamp, Lookout Branch, and Mulberry Branch. Figure 21 shows these floodplains in the study area. It should also be noted that there are no FEMA buyout properties within the study area.

The floodplain for Cawcaw Swamp is approximately 1,800 to 5,200 feet wide in the study area. According to the limited detailed study, the 100-year flood elevation is 26.9 feet immediately upstream of the existing Ash Little River Road (SR 1300) crossing. Alternatives 1, 1A, 4, and 4A cross Cawcaw Swamp at several new alignment locations. This floodplain consists of some residential and golf course development and undeveloped pine and hardwood forest.

The floodplain for Shingletree Swamp is approximately 440 to 4,400 feet wide in the study area. According to the limited detailed study, the 100-year flood elevation is 27.0 feet for the majority of the floodplain due to backwater effects from Cawcaw Swamp; but 34.1 feet immediately upstream of the existing US 17 crossing. Alternatives 2, 7, and 8 cross Shingletree Swamp along several new alignments and several existing crossings. This floodplain consists of some residential and golf course development, fallow, and some pine and hardwood forest.

The floodplain Little Cawcaw Swamp is approximately 1,400 to 3,200 feet wide in the study area. According to the limited detailed study, the 100-year flood elevation is 34.1 feet immediately upstream of the existing US 17 crossing. Alternatives 2, 7, and 8 utilize the existing US 17 crossing at Little Cawcaw swamp and will require the existing culverts to be replaced. This floodplain consists of some residential development downstream and undeveloped pine and hardwood forest upstream.

The floodplain for Lookout Branch is approximately 300 to 500 feet wide in the study area. According to the detailed study, the 100-year flood elevation is 14.0 feet immediately upstream of the existing US 17 crossing. All of the Detailed Study Alternatives utilize the existing US 17 crossing at Lookout Branch and will require the existing culvert to be extended. This floodplain is undeveloped and consists of predominantly pine and hardwood forest with low-lying swamp and wetland areas.

The floodplain for Mulberry Branch is approximately 500 to 1,000 feet wide in the study area. According to the detailed study, the 100-year flood elevation is 13.1 feet immediately upstream of the existing US 17 crossing. All of the Detailed Study Alternatives utilize the existing US 17 crossing at Mulberry Branch and will require the existing culvert to be extended. This floodplain is undeveloped and consists of predominantly pine and hardwood forest with low-lying swamp and wetland areas.

The floodplains for Cawcaw Swamp, Shingletree Swamp, Little Cawcaw Swamp, Lookout Branch, and Mulberry Branch, attenuate stormwater runoff, reducing the impacts of major riverine flooding events. All of the Detailed Study Alternatives cross one or more of the aforementioned floodplains. The NCDOT Hydraulics Unit will coordinate with the North Carolina Floodplain Mapping Program (FMP), the delegated state agency for administering FEMA's NFIP, to determine the status of the project with regard to applicability of NCDOT's Memorandum of Agreement with FMP (dated April 22, 2013, modified August 12, 2016), or approval of a Conditional Letter of Map Revision (CLOMR) and subsequent final Letter of Map Revision (LOMR).

3.3.8 Protected Lands

3.3.8.1 Wild and Scenic Rivers

No Wild and Scenic Rivers are located within the study area.

3.3.8.2 State/National Forests

No state or national forests are located within the study area.

3.3.8.3 Preservation Areas

There are several Significant Natural Heritage Areas (SNHAs) and managed preservation areas in the study area. These areas are described below and shown on Figure 19.

The Waccamaw River Heritage Preserve is an approximately 5,000-acre State Conservation Area owned and managed by the South Carolina Division of Natural Resources (SCDNR). It is located along the Waccamaw River near the northwestern boundary of the study area in South Carolina. Most of the preserve is located outside of the study area, but two small portions extend into the study area boundary. The preserve was established to protect a range of natural resource functions, including a diverse riverine ecosystem that supports several rare plant species, a travel corridor for black bear, and a buffer for the Waccamaw River, which has value as a black water river and the only river originating from a Carolina Bay (Lake Waccamaw in Columbus County, North Carolina). The preserve is open year round to the public during daylight hours and there are seven boat landings along the river to provide public access for boating.

River Hills Golf Course is held under a 374-acre private conservation easement established in 2001 through the North American Land Trust. The golf course is part of River Hills Golf and Country Club, which is located within the study area on River Hills Drive in Little River, just north of US 17 and west of Little River Road. River Hills Golf Course is open to the public.

Gause Savanna is a 121-acre SNHA located on the north side of US 17 just east of the Pea Landing Road/ Thomasboro Road intersection. The site is privately owned and is located entirely within the study area.

The Sandy Branch Sand Ridge and Bay Complex is a 1,032-acre SNHA located on the south side of US 17 to the east of Ocean Isle Beach Road. The site is also privately owned. A small portion of the SNHA boundary is within the study area just to the south of the US 17/US 17 Business/Old Shallotte Road intersection.

The Ducks Unlimited (Wetlands America Trust) Easement is a 2,940-acre managed area owned by Ducks Unlimited (Wetlands America Trust) located along the Brunswick County side of the Waccamaw River to the west of Ash-Little River Road. A small portion of the managed area's boundary is within the study area just to the west of the Ash-Little River Road/No. 5 School Road intersection. The property is held under a private conservation easement and is not open to public access. It is managed for multiple uses and is subject to extractive (e.g., mining or logging) or off-highway vehicle use.

The Nature Conservancy Easement is a 46-acre managed area owned by The Nature Conservancy located to the west of the Ash-Little River Road/No. 5 School Road intersection. The entire site is located within the study area. It is managed for its biodiversity and to suppress disturbance events to the property.

The North American Land Trust Easement is a 232-acre managed area owned by the North American Land Trust. The site is located to the south of US 17 between Thomasboro Road and NC 904 and is located entirely within the study area. It is also managed for multiple uses and is subject to extractive (e.g., mining or logging) or off-highway vehicle use.

The Cool Run Mitigation Site is a planned 25-acre mitigation site located within the study area to the west of the northern end of Starboard Road. The site is currently privately owned, but will be provided to the North Carolina Division of Mitigation Services as a mitigation site for the purposes of restoration and enhancement of stream channels and riparian wetlands within the site. The site consists of the headwaters of Cool Run (a first-order tributary of the Shallotte River), an unnamed tributary to Cool Run, and former wetland areas historically impacted by prescribed site drainage practices. The site is currently managed for silvicultural and agricultural production. Cool Run has been channelized over the years and most of the natural wetland areas adjacent to the channel have been drained. Riparian areas

that were not recently harvested support a canopy of red maple and sweetgum with a fairly dense subcanopy and shrub layer.

Stone Farm Mitigation Bank is an approximately 911-acre, privately-owned, wetlands and stream compensation mitigation bank established in January 2009. A portion of the site is located within the study area on the south side of US 17 to the east of Thomasboro Road. The mitigation bank is located completely within the planned Stone Farm residential subdivision.

3.4 Cultural Resources

Section 106 of the National Historic Preservation Act of 1966, as amended (36 CFR 800), requires Federal agencies to take into account the effects of their undertaking on historic properties (including archaeological sites) and afford the Advisory Council on Historic Preservation an opportunity to participate if the undertaking results in any adverse effects to historic properties. In accordance with the requirements of Section 106 and the NEPA, surveys were conducted to identify cultural resources in the study area.

3.4.1 Historic Architectural Resources

An architectural survey of the Area of Potential Effects (APE) for the South Carolina portion of the Carolina Bays Parkway Extension study area was conducted between April and June of 2021. A total of 55 resources over 50 years of age in the APE were assessed. Four of those resources on three properties were recommended eligible for the National Register of Historic Places (NRHP). In an email dated May 5, 2022, the South Carolina State Historic Preservation Office (HPO) concurred that two of these resources (Old Mount Calvary Cemetery and Gore-Skipper Property Tobacco Barn, ca. 1880s) were eligible for the NRHP. For the North Carolina portion of the study area, an architectural survey of the APE was conducted between January and April of 2021. A total of 398 buildings and structures over 50 years of age in the APE were assessed. Of those resources, the North Carolina State HPO determined that four individual resources and one potential historic district warranted intensive NRHP eligibility evaluations. After further detailed evaluations of the five potentially-eligible resources in the North Carolina portion of the study area, two resources (Shallotte Prison Camp and Somersett-Platt House) were recommended eligible for the NRHP. The North Carolina State HPO concurred with these eligibility determinations in a letter dated March 15, 2022. No properties were identified that are currently listed on the NRHP in either the South Carolina or the North Carolina portions of the study area. The historic architectural resources determined eligible for the NRHP in both states are listed in Table 3-11 and shown on Figure 19. Copies of the concurrence correspondence from the HPOs in both states is included in Appendix B.

In early 2023, the APE in North Carolina was expanded to include a portion of Hickman Road (from just west of Ash Little River Road to just west of Shingletree Road) to accommodate Construction Phase 1 – Scenario 2 (CP1 – S2). North Carolina HPO requested that two resources (Bethel Primitive Baptist Church and Andrews Chapel Global Methodist Church) within the expanded APE for CP1 – S2 be evaluated for NRHP eligibility. An architectural survey conducted for these two resources indicated that neither resource met the integrity and criteria standards to be potentially eligible for the NRHP, under Section 106 of the National Historic Preservation act of 1966. In a letter dated December 7, 2023, the North Carolina State HPO concurred that the two resources evaluated within the expanded APE for CP1 – S2 are not eligible for listing on the NRHP. A copy of the December 2023 concurrence correspondence from the North Carolina HPO is included in Appendix B.

Table 3-11. Historic Architectural Resources Eligible for the National Register in the Study Area

Property Name	Location	Property Type
South Carolina		
Old Mount Calvary Cemetery	Along Cemetery Road, Little River	Cemetery; ca. 1875
Gore-Skipper Property Tobacco Barn	1950 Worthams Cutoff Road, Little River	Tobacco Barn; ca. 1880s
North Carolina		
Shallotte Prison Camp	430 Mulberry Street, Shallotte	Former Prison Camp; ca. 1932
Somersett-Platt House	7311 Ocean Highway West, Sunset Beach	Craftsman Bungalow House and Farmstead; built 1933

The APE in South Carolina was also expanded in early 2023 to include portions of Little River Road and Mineola Avenue (from just west of Lafayette Park Drive to US 17 in Little River) to accommodate Construction Phase 1 – Scenario 1 (CP1 – S1). One resource that is within the expanded APE for CP1 – S1 (Little River United Methodist Church Cemetery) has been identified for further evaluation. The Horry County Preservation Commission lists the Little River United Methodist Church Cemetery, located at 1629 US 17, Little River, South Carolina, on the Horry County Historic Property Register. Further review of this resource will be needed to determine its potential eligibility for the NRHP.

3.4.2 Archaeological Resources

Due to the number of Detailed Study Alternatives (seven), an intensive archaeological survey has not been initiated. Following the approval of this DEIS and the corridor public hearing, the interagency Merger Team will meet to select the Applicant's Preferred/Least Environmentally Damaging Practicable Alternative (LEDPA) corridor in accordance with the procedures detailed in the NEPA/Section 404 Merger Process. After the selection of the Applicant's Preferred/LEDPA by the Merger Team, detailed archaeological surveys will be conducted along the LEDPA corridor pursuant to Section 106 of the National Historic Preservation Act and the guidelines issued by the Advisory Council on Historic Preservation. These archaeological surveys will be completed prior to completion of the FEIS, and the results will be detailed in the FEIS.

3.4.3 Tribal Lands

There are no American Indian tribal lands in the project study area.

3.5 Section 4(f) and Section 6(f) Resources

Section 4(f) of the US Department of Transportation Act of 1966, as amended, specifies that publicly owned land from a public park, recreation area, wildlife and waterfowl refuge, and all historic sites of national, state, and local significance may be used for Federal projects only if there is no feasible and prudent alternative to the use of such land (23 CFR 774.3(a)(1)) and the project includes all possible planning to minimize impacts to 4(f) lands resulting from such use (23 CFR 774.3(a)(2)). Historic resources protected by this regulation include resources that are eligible for listing, or listed, on the NRHP. As discussed in Section 3.4.1, there are two NRHP-eligible historic architectural resources within the South Carolina portion of the study area and two resources within the North Carolina portion of the

study area. Parks and recreation areas within the study area, including the Waccamaw River Heritage Preserve and three public parks, are discussed in Section 3.1.3. There are no wildlife and waterfowl refuges protected by Section 4(f) within the study area. Table 3-12 provides a list of the Section 4(f) resources in the South Carolina and North Carolina portions of the study area. The Section 4(f) resources within the study area are also shown on Figure 25.

Table 3-12. Section 4(f) Resources in the Study Area

Property Name	Location	Property Type
South Carolina		
Old Mount Calvary Cemetery	Along Cemetery Road, Little River	Cemetery; ca. 1875
Gore-Skipper Property Tobacco Barn	1950 Worthams Cutoff Road, Little River	Tobacco Barn; ca. 1880s
Waccamaw River Heritage Preserve	Along Waccamaw River near northwestern boundary of study area in South Carolina	State Conservation Area; approximately 5,000 acres
North Strand Recreation Center	120 S-57, Little River	Public Park; gymnasium and ball fields
Vereen Memorial Gardens	2250 SC 179, Little River	Public Park; approximately 115 acres
North Carolina		
Shallotte Prison Camp	430 Mulberry Street, Shallotte	Former Prison Camp; ca. 1932
Somersett-Platt House	7311 Ocean Highway West, Sunset Beach	Craftsman Bungalow House and Farmstead; built 1933
Shallotte Township District Park	5550 Main Street, Shallotte	Public Park; approximately 68 acres

The Land and Water Conservation Fund Act of 1965, as amended, allows state and local governments to obtain grants for acquiring or improving parks and recreation areas. Section 6(f) of this Act prohibits the conversion of property acquired or developed with these grants to a non-recreational purpose without the approval of the Department of the Interior's National Park Service. According to National Park Service Land and Water Conservation Fund data from April 2022, the only Section 6(f) resource within the study area is the Shallotte Township District Park, which is discussed above in Section 3.1.3.

3.6 Natural Environment Characteristics

Field investigations were conducted by qualified biologists between May 2020 and January 2023 to assess the existing natural environment within the corridors for the Detailed Study Alternatives. Details of the methodology and investigations supporting the information provided in this section are provided in the Natural Resources Technical Report (NRTR) completed in March 2023, appended by reference.

3.6.1 Soils/Topography/Geology

A limited geotechnical investigation was completed by NCDOT in September 2020 to evaluate subsurface conditions along the proposed alternatives. The investigation consisted of a field reconnaissance visit and soil survey, along with a review of subsurface data from previous investigations

completed in the area, in order to determine the suitability of subgrade material and ground water depth.

The proposed project lies within the Coastal Plain Physiographic Province. Topography in the study area is nearly level. Surface water generally flows into the Shallotte River, Cawcaw Swamp, or other adjacent swampy areas that drain into the Waccamaw River, resulting in very poorly drained soils adjacent to these creeks. Roadway embankment and alluvial soils are found within the project limits.

The geology along the northern alternative corridors (Alternatives 1, 1A, 4, and 4A) consists of undivided coastal plain sands and clays. Soils in the floodplains along these alternatives consist of three to seven feet of muck. Groundwater levels were recorded from two to 0.1 feet above natural ground in the floodplain, to six feet or more below natural ground in the upland areas.

The geology along the southern alternative corridors (Alternatives 2, 7, and 8) consists of undivided coastal plain soils composed of sand, as well as sandy and silty clay. Soils in the floodplains along these alternatives consists of six feet or more of silty sand. Groundwater levels range from 0.5 feet below natural ground in the floodplains, to six feet or more below natural ground in the upland areas.

3.6.2 Terrestrial Communities

Fifteen terrestrial communities were identified within the corridors for the Detailed Study Alternatives. The location and extent of these terrestrial communities within the Detailed Study Alternative corridors are shown on Figure 22. Table 3-13 summarizes the terrestrial community coverage within the corridors for the Detailed Study Alternatives for both North Carolina and South Carolina, as well as the dominant species within each terrestrial community.

3.6.3 Water Resources

Descriptions of water resources identified within the corridors for the Detailed Study Alternatives during field investigations include physical and water quality characteristics, best usage classifications, and relationships to major regional drainage systems. Water resources in the study area are part of the Lumber River and Yadkin-Pee Dee River basins (U.S. Geological Survey [USGS] Hydrologic Units 03040206 and 03040208).

3.6.3.1 Wells

North Carolina Division of Water Resources (NCDWR) data indicates there are four public water supply wells located within or immediately adjacent to the Brunswick County portion of the study area (see Figure 19).

SCDHEC data indicates there are four Public Water Supply Well Protection Zones located within the Horry County portion of the study area (see Figure 19). Three of the well protection zones are associated with the Little River Water and Sewerage Company, and one is associated with the Bell Pontiac automobile dealership.

Table 3-13. Coverage of Terrestrial Communities within the Detailed Study Alternative Corridors

Community	Dominant Species (Scientific Name)	Coverage (acres)		
		North Carolina[1]	South Carolina[2]	Total
Maintained/Disturbed	Tall fescue (*Festuca arundinacea*) Wild onion (*Allium* sp.) Plantain (*Plantain plantago*)	3,934.6	874.5	4,809.1
Mesic Mixed Hardwood Forest	Red maple (*Acer rubrum*) Tulip poplar (*Liriodendron tulipifera*) Swamp bay (*Persea palustrus*)	485.1	522.5	1,007.6
Pine/Scrub Oak Sandhill	Longleaf pine (*Pinus palustris*) Turkey oak (*Quercus laevis*) Wiregrass (*Aristida stricta*)	555.4	279.6	835.0
Wet Pine Flatwood	Longleaf pine (*Pinus palustris*) Loblolly pine (*Pinus taeda*) Swamp bay (*Persea palustrus*)	177.0	506.1	683.1
Coastal Plain Bottomland Hardwoods	Willow oak (*Quercus phellos*) Loblolly pine (*Pinus taeda*) Red maple (*Acer rubrum*)	451.7	133.9	585.6
Coastal Plain Small Stream Swamp	Swamp tupelo (*Nyssa biflora*) Sweetgum (*Liquidambar styraciflua*) Laurel oak (*Quercus laurifolia*)	440.1	N/A	440.1
Pine Plantation	Loblolly pine (*Pinus taeda*) Bracken fern (*Pteridium aquilinum*) Trumpet creeper (*Campsis radicans*)	246.1	57.8	303.9
Pond Pine Woodland	Pond pine (*Pinus serotina*) Inkberry *(Ilex glabra*) Fetterbush (*Lyonia lucida*)	186.5	7.6	194.1
Open Water	NA	101.2	24.1	125.3
Cypress-Gum Swamp	Bald cypress (*Taxodium distichum*) Black gum (*Nyssa biflora*) Fetterbush (*Lyonia lucida*)	114.0	N/A	114.0
Non-Riverine Swamp Forest	Swamp tupelo (*Nyssa aquatica*) Bald cypress (*Taxodium distichum*) Sweetgum (*Liquidambar styraciflua*)	N/A	75.6	75.6
High Pocosin	Fetterbush (*Lyonia lucida*) Inkberry (*Ilex glabra*) Laurel greenbrier (*Smilax laurifolia*)	11.6	19.9	31.5
Other Wetland	Broadleaf cattail (*Typha latifolia*) Soft rush (*Juncus effusus*) Groundseltree (*Baccharis halimifolia*)	25.2	2.2	27.4
Xeric Sandhill Scrub	Longleaf pine (*Pinus palustris*) Turkey oak (*Quercus laevis*) Pineland scalypink (*Stipulicida setacea*)	12.0	15.4	27.4
Bald Cypress Tupelo Gum Swamp	Bald cypress (*Taxodium distichum*) Swamp tupelo (*Nyssa aquatica*) Red maple (*Acer rubrum*)	N/A	4.9	4.9
Total		**6,740.5**	**2,524.1**	**9,264.6**

[1]NC Natural Heritage Program natural community classifications (Schafale and Weakley, Third Approximation, 1990).
[2]Nelson's Natural Communities of South Carolina (1986).

3.6.3.2 Surface Waters

3.6.3.2.1 Streams

A total of 109 potential jurisdictional streams were identified within the corridors for the Detailed Study Alternatives (see Table E-1 in Appendix E). Streams within the Detailed Study Alternative corridors are shown on Figure 23. Twenty-seven streams within, or within one mile downstream, of the Detailed Study Alternative corridors have been designated High Quality Waters (HQW) by NCDWR. All are located within North Carolina and are unnamed tributaries to either Lookout Branch or the Shallotte River. None have been designated Outstanding Resource Waters (ORW) by NCDWR. All of these streams are identified in Table E-1 in Appendix E and are designated as HQW due to the classification of their receiving waters. There are no water supply watersheds (WS-I or WS-II) within, or within one mile downstream of the Detailed Study Alternative corridors. The North Carolina 2022 Final 303(d) list of impaired waters identifies no streams within the Detailed Study Alternative corridors as impaired. The South Carolina 2022 Final 303(d) list also identifies no streams within the Detailed Study Alternative corridors as impaired. Additionally, there are no streams identified in the Detailed Study Alternative corridors as trout, anadromous fish, or primary nursery waters.

3.6.3.2.2 Tributaries and Ponds

A total of 422 potential jurisdictional tributaries and ponds were identified within the corridors for the Detailed Study Alternatives (see Table E-2 in Appendix E). Tributaries are channels with an ordinary high-water mark (OHWM) that have ephemeral or temporary flow, instead of intermittent or perennial flow as with a stream. Tributaries are included in preliminary jurisdictional determinations (PJDs) due to their potentially jurisdictional status. Tributaries and ponds within the Detailed Study Alternative corridors are shown on Figure 23. Table E-2 in Appendix E provides the approximate length or area of each tributary and pond identified. If the tributary or pond is directly connected to a potential jurisdictional stream or wetland, the name of that feature is also indicated in the table.

3.6.3.2.3 Wetlands

A total of 351 potential jurisdictional wetlands were identified within the corridors for the Detailed Study Alternatives (see Table E-3 in Appendix E). Wetlands within the Detailed Study Alternative corridors are shown on Figure 23. Wetland classification and quality rating data are presented in Table E-3 in Appendix E. All wetlands identified are located within the Waccamaw watershed (USGS Hydrologic Unit 03040206) and Coastal Carolina watershed (USGS Hydrologic Unit 03040208).

3.6.4 Jurisdictional Issues

3.6.4.1 Waters of the United States

Section 404 of the Clean Water Act requires regulation of discharges into “Waters of the United States.” The US Environmental Protection Agency (USEPA) is the principal administrative agency of the Clean Water Act; however, the US Army Corps of Engineers (USACE) has the responsibility for implementation, permitting, and enforcement of the provisions of the Act. The USACE regulatory program is defined in 33 CFR 320-332.

Surface waters (lakes, rivers, and streams) and wetlands are subject to jurisdictional consideration under the Section 404 program. Any action that proposes to place fill into these areas falls under the jurisdiction of the USACE under Section 404 of the Clean Water Act (33 U.S.C. 1344).

Section 401 of the Clean Water Act grants authority to individual states for regulation of discharges into "Waters of the United States." Under North Carolina General Statutes, 113A "Pollution Control and Environment" and codified in NCAC 15A, the NCDWR has the responsibility for implementation, permitting, and enforcement of the provisions of the Act. Under South Carolina Code Sections 48-1-30 and 48-1-50, the SCDHEC is responsible for administering the Section 401 program in South Carolina.

3.6.4.2 Buffer Areas

Streams within the North Carolina portion of the study area are part of the Lumber River and Yadkin-Pee Dee River basins. There are no streamside riparian zones within the study area that are protected under provisions of North Carolina River Basin Buffer Rules administered by NCDWR. There are no buffer rules in effect for Horry County, South Carolina.

3.6.4.3 Protected Species

Some populations of fauna and flora have been, or are in the process of decline due to either natural forces or their inability to coexist with humans. Federal law (under the provisions of Section 7 of the Endangered Species Act [ESA] of 1973, as amended) requires that any action likely to adversely affect a species classified as Federally-protected be subject to review by the US Fish and Wildlife Service (USFWS). Prohibited actions which may affect any species protected under the ESA are outlined in Section 9 of the Act.

Species which are listed, or are proposed for listing, as endangered (E) or threatened (T) are recorded in Section 4 of the ESA. As defined by the ESA, an endangered species is any plant or animal which is in danger of extinction throughout all or a significant portion of its range within the foreseeable future. A threatened species is any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

As of January 16, 2024, the USFWS Information for Planning and Consultation (IPaC) tool and the National Oceanic and Atmospheric Administration (NOAA) list 22 Federally-protected species for Horry County and 16 Federally-protected species for Brunswick County under the ESA. In addition, one proposed endangered species (tricolored bat) is listed for both counties. Table 3-14 lists the Federally-protected species for Horry and Brunswick Counties. The table also indicates whether or not habitat is present within the study area for each species. Habitat requirements for each species are based on the current best available information as per referenced literature and USFWS correspondence. South Carolina requires a 2.0-mile search radius for protected species, and North Carolina requires a 1.0-mile search radius for protected species.

3.6.4.4 Bald Eagle and Golden Eagle Protection Act

The bald eagle was declared recovered, and removed (de-listed) from the Federal List of Threatened and Endangered Species effective August 8, 2007. The bald eagle remains Federally-protected under the Bald and Golden Eagle Protection Act (Eagle Act) (16 U.S.C. 668-668d). The Eagle Act prohibits take of bald and golden eagles and provides a statutory definition of "take" that includes "disturb". The Eagle Act is enforced by the USFWS.

Table 3-14. Federally-Protected Species Listed for Horry and Brunswick Counties

Scientific Name	Common Name	Federal Status	Habitat Present	County
Alligator mississippiensis	American alligator	T(S/A)	Yes	Horry/Brunswick
Schwalbea americana	American chaffseed	E	Yes	Horry
Acipenser oxyrinchus	Atlantic sturgeon	E	No	Horry/Brunswick
Oxypolis canbyi	Canby's dropwort	E	Unknown	Horry
Thalictrum cooleyi	Cooley's meadowrue	E	Yes	Brunswick
Balaenoptera physalus	Finback whale	E	No	Horry
Chelonia mydas	Green sea turtle	T(C/H)	No	Horry/Brunswick
Megaptera novaengliae	Humpback whale	E	No	Horry
Lepidochelys kempii	Kemp's ridley sea turtle	E	No	Horry/Brunswick
Dermochelys coriacea	Leatherback sea turtle	E(C/H)	No	Horry/Brunswick
Caretta caretta	Loggerhead sea turtle	T(C/H)	No	Horry/Brunswick
Planorbella magnifica	Magnificent ramshorn	E(C/H)	No	Brunswick
Myotis septentrionalis	Northern long-eared bat	E	Yes	Horry/Brunswick
Charadrius melodus	Piping plover	T(C/H)	No	Horry/Brunswick
Lindera melissifolia	Pondberry	E	Unknown	Horry
Picoides borealis	Red-cockaded woodpecker	E	Yes	Horry/Brunswick
Calidris canutus rufa	Rufa red knot	T	No	Horry/Brunswick
Balaena glacialis	Right whale	E	No	Horry
Lysimachia asperulaefolia	Rough-leaved loosestrife	E	Yes	Brunswick
Amaranthus pumilus	Seabeach amaranth	T	No	Horry/Brunswick
Balaenoptera borealis	Sei whale	E	No	Horry
Acipenser brevirostrum	Shortnose sturgeon	E	No	Horry
Physeter macrocephalus	Sperm whale	E	No	Horry
Perimyotis subflavus	Tricolored bat	PE	Yes	Horry/Brunswick
Trichechus manatus	West Indian manatee	T(C/H)	No	Horry/Brunswick
Mycteria americana	Wood stork	T	Yes	Horry/Brunswick

E – Endangered; T – Threatened; T(S/A) – Threatened due to Similarity of Appearance; T(C/H) – Threatened (Critical Habitat); E(C/H) – Endangered (Critical Habitat); PE – Proposed Endangered; Unknown – Additional surveys will be conducted during appropriate survey window to determine presence of habitat for these species.

Golden eagles do not nest in North Carolina. Habitat for the bald eagle primarily consists of mature forests in proximity to large bodies of open water for foraging. Large dominant trees are utilized for nesting sites, typically within 1.0 mile of open water. A desktop GIS assessment of the project study area, as well as the area within a 1.0-mile radius of the project limits, was performed on December 14, 2020, using current color aerial photography. Water bodies large enough or sufficiently open to be considered potential feeding sources were identified. Since there is foraging habitat within the review area, a survey of the project study area and the area within 660 feet of the project limits was conducted on March 15, April 20 to 21, and June 21 to 24, 2021. No bald eagles were observed during these

surveys. Additionally, a review of the NC NHP database on January 23, 2023, revealed no known occurrences of this species within 1.0 mile of the project study area. A review of SC NHP records on January 23, 2023, indicated no known occurrences within 2.0 miles of the study area.

3.6.4.5 Migratory Birds

The Migratory Bird Treaty Act (MBTA) of 1918 is intended to ensure the sustainability of populations of all protected migratory bird species. It prohibits the take (including killing, capturing, selling, trading, and transport) of protected migratory bird species without prior authorization by the USFWS. Executive Order 13186 directs federal agencies to minimize adverse impacts on migratory birds. According to the USFWS IPaC online tool (accessed December 12, 2024), with a focus on Birds of Conservation Concern (BCCs), the migratory birds listed in Table 3-15 are potentially present in the study area.

3.6.4.6 Essential Fish Habitat

The National Marine Fisheries Service has developed fishery management plans for Essential Fish Habitats (EFH) in various waters of the United States. The management plans are directed towards maintaining functioning, profitable commercial fishery populations with a long-term recommendation of "no net loss" of existing habitat. The South Atlantic Region has developed mapping depicting in-land primary and secondary nursery areas for certain commercial species. In a letter dated September 17, 2017 (see Appendix B), NMFS indicated that it had identified potential EFH for the Snapper-Grouper complex within the study area in North Carolina within the Alternative 8 corridor. However, in an email dated January 3, 2022 (see Appendix B), NMFS subsequently determined that there is no EFH in the project study area**.**

3.6.4.7 Coastal Zone Areas

The Coastal Zone Management Act (CZMA) was passed by Congress in 1972. As a result of the Federal CZMA, both South Carolina and North Carolina passed state coastal protection laws. SCDHEC-Ocean and Coastal Resource Management issues Coastal Zone Consistency Certifications in accordance with South Carolina's Coastal Zone Management Plan and Coastal Zone Management Act for development activity involving Federal funding or permits in South Carolina's eight coastal counties, including Horry County. The North Carolina Division of Coastal Management (NCDCM) also issues consistency determinations and permits for development in coastal Areas of Environmental Concern (AEC) in North Carolina's 20 coastal counties, including Brunswick County, in accordance with North Carolina's Coastal Area Management Act (CAMA).

Two types of NC CAMA AEC occur within the study area: Public Trust Waters and Coastal Shorelines. During the October 2021 Concurrence Point 2A field meeting for hydraulic crossing sites in Brunswick County (see Section 5.1.1), NCDCM representatives indicated that the open waters of Cawcaw Swamp and Shingletree Swamp at major hydraulic site 21, as well as the open waters of Shingletree Swamp at major hydraulic site 23, would be designated as NC CAMA Public Trust Waters (PTW) AEC. In addition, the first 30 feet of ground along both sides of the normal high water lines of these NC CAMA PTWs are classified as NC CAMA Coastal Shoreline AEC and buffer. The NC CAMA AECs within the study area are shown on Figure 24. A NC CAMA Major Permit would be required for any of the Detailed Study Alternatives that impact a NC CAMA AEC.

Table 3-15. Migratory Birds Potentially Present in Study Area

Scientific Name	Common Name	Breeding Season
Falco sparverius paulus	American kestrel	April 1 to August 31
Haematopus palliatus	American oystercatcher	April 15 to August 31
Peucaea aestivalis	Bachman's sparrow	May 1 to September 30
Haliaeetus leucocephalus	Bald eagle	September 1 to July 31
Rynchops niger	Black skimmer	May 20 to September 15
Sitta pusilla	Brown-headed nuthatch	March 1 to July 15
Chaetura pelagica	Chimney swift	March 15 to August 25
Antrostomus carolinensis	Chuck-will's-widow	May 10 to July 10
Setophaga virens waynei	Coastal black-throated green warbler	May 1 to August 15
Antrostomus vociferus	Eastern whip-poor-will	May 1 to August 20
Gelochelidon nilotica	Gull-billed tern	May 1 to July 31
Rallus elegans	King rail	May 1 to September 5
Sternula antillarum antillarum	Least tern	April 25 to September 5
Tringa flavipes	Lesser yellowlegs	Breeds elsewhere
Limosa fedoa	Marbled godwit	Breeds elsewhere
Passerina ciris	Painted bunting	April 25 to August 15
Calidris melanotos	Pectoral sandpiper	Breeds elsewhere
Setophaga discolor	Prairie warbler	May 1 to July 31
Protonotaria citrea	Prothonotary warbler	April 1 to July 31
Melanerpes erythrocephalus	Red-headed woodpecker	May 10 to September 10
Arenaria interpres morinella	Ruddy turnstone	Breeds elsewhere
Euphagus carolinus	Rusty blackbird	Breeds elsewhere
Ammospiza caudacuta	Saltmarsh sparrow	May 15 to September 5
Calidris pusilla	Semipalmated sandpiper	Breeds elsewhere
Limnodromus griseus	Short-billed dowitcher	Breeds elsewhere
Elanoides forficatus	Swallow-tailed kite	March 10 to June 30
Numenius phaeopus hudsonicus	Whimbrel	Breeds elsewhere
Tringa semipalmata	Willet	April 20 to August 5
Charadrius wilsonia	Wilson's plover	April 1 to August 20
Hylocichla mustelina	Wood thrush	May 10 to August 31

3.6.4.8 Anadromous Fish Habitat

Anadromous fish are species that spend their adult lives in the ocean but return to freshwater habitats to reproduce. A review of North Carolina Division of Marine Fisheries maps in December 2021 indicated

there are no anadromous fish spawning areas present in the study area. There are no bodies of water within the South Carolina portion of the study area that would support anadromous fish.

3.6.4.9 Submerged Aquatic Vegetation

There is no submerged aquatic vegetation present in the study area.

4.0 Environmental Consequences

This chapter identifies the reasonably foreseeable beneficial and adverse social, economic, and environmental consequences of each of the seven Detailed Study Alternatives, including both Construction Phase 1 scenarios (see Section 2.5). Both human and natural environmental resources within the study area, or alternative corridors, were identified in Chapter 3. A preliminary design was established within each Detailed Study Alternative corridor, including both Construction Phase 1 scenario corridors, for the purpose of assessing impacts to the natural and human environment. The impacts presented in this chapter are based on preliminary design plans. The impacts identified for each Detailed Study Alternative include the impacts associated with both potential Construction Phase 1 scenarios (i.e., Construction Phase 1 – Scenario 1 [CP1 – S1] and Construction Phase 1 – Scenario 2 [CP1 – S2]) in order to compare the potential "worst-case" impacts for the seven Detailed Study Alternatives. Although all of the Detailed Study Alternatives, including both Construction Phase 1 scenarios, are still under consideration, Alternative 4 has been identified by both SCDOT and NCDOT as those agencies' Preferred Alternative, as discussed in Section 2.4. A final decision on the alternative selection will not be made until comments received on the Draft Environmental Impact Statement (DEIS) and at the corridor public hearing have been fully evaluated. After the corridor public hearing, the Merger Team will meet to select the Applicant's Preferred/Least Environmentally Damaging Practicable Alternative (LEDPA) corridor in accordance with the procedures detailed in the National Environmental Policy Act (NEPA)/ Section 404 Merger Process, which includes consideration of public comments and the local sponsors' Preferred Alternative.

On January 20, 2025, President Trump signed Executive Order (E.O.) 14148, *Initial Rescissions of Harmful Executive Orders and Actions*, and E.O. 14154, *Unleashing American Energy*. The E.O.s revoked E.O. 13990, *Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis* (January 20, 2021), and E.O. 14008, *Tackling the Climate Crisis at Home and Abroad* (January 27, 2021). Subsequently, on January 29, 2025, Secretary Duffy signed a Memorandum for Secretarial Offices and Heads of Operating Administrations, *Implementation of Executive Orders Addressing Energy, Climate Change, Diversity, and Gender*. On February 25, 2025, the Council on Environmental Quality (CEQ) published an Interim Final Rule removing the CEQ's NEPA implementing regulations, effective April 11, 2025 (90 Fed. Reg. 10610). As a result of these actions, the Federal Highway Administration (FHWA) will not include greenhouse gas emissions and climate change analyses in the federal environmental review process. Any purported greenhouse gas emissions and climate change impacts will not be considered in the federal decision. Accordingly, no greenhouse gas emissions or climate change analyses are included in this DEIS.

On January 20, 2025, President Trump signed E.O. 14148, *Initial Rescissions of Harmful Executive Orders and Actions*, and E.O. 14154, *Unleashing American Energy*. The E.O.s revoked E.O. 14096, *Revitalizing Our Nation's Commitment to Environmental Justice for All* (April 21, 2023). Subsequently, on January 21, 2025, President Trump signed E.O. 14173, *Ending Illegal Discrimination and Restoring Merit-Based Opportunity*. This E.O. revoked E.O. 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (February 11, 1994). On February 25, 2025, the CEQ published an Interim Final Rule removing the CEQ's NEPA implementing regulations, effective April 11, 2025 (90 Fed. Reg. 10610). As a result of these actions, all federal environmental justice requirements are revoked and no longer apply to the federal environmental review process. FHWA, Federal Transit Administration (FTA), and Federal Railroad Administration's (FRA's) Joint NEPA regulations (23 CFR 771) and the agencies' Interim Final Guidance on "Section 139 Environmental Review Process: Efficient

Environmental Reviews for Project Decisionmaking and One Federal Decision" (December 17, 2024) do not require an environmental justice analysis. Accordingly, no analysis of environmental justice is included in this DEIS. Any purported environmental justice impacts will not be considered in the federal decision. Social, economic, and community impacts will continue to be disclosed, where applicable, in accordance with 23 CFR 771.

4.1 Human Environment Impacts for Detailed Study Alternatives

4.1.1 Community Cohesion Impacts

Impacts to community cohesion can include disruption of physical connections between people and resources within the community, alteration of existing patterns of interaction between people and resources, and/or potential barrier effects that occur as a result of the project. This assessment of potential impacts considers the nature of existing physical connections and patterns of interaction between people and resources within the community relative to future conditions with each of the seven Detailed Study Alternatives for the proposed Carolina Bays Parkway Extension. A detailed discussion of potential impacts to community cohesion is provided in the *Community Impact Assessment* (STV, February 2023).

Neighborhoods

Community cohesion was assessed for each individual existing neighborhood within the study area. Community cohesion impacts occur if the proposed Detailed Study Alternatives would likely alter the overall functioning of an identifiable neighborhood, including disruption of physical connections between people and resources, alteration of existing patterns of interaction, and/or potential barrier effects that occur as a result of the proposed project. This includes relocations/removal of key community facilities and displacement of residential areas. The proposed Detailed Study Alternatives would pass through predominantly fringe areas of a few individual subdivisions on the new location freeway Carolina Bays Parkway Extension portion of each alternative, constructing a physical barrier through areas that are homogenously residential, thereby resulting in broad-scale fragmentation that would disrupt existing patterns of interaction. Impacted subdivisions are shown on Figure 19.

Most of the neighborhoods in the Horry County portion of the study area would not be directly impacted by the proposed Detailed Study Alternatives and therefore would not have cohesion issues. The following neighborhoods in Horry County would experience community cohesion impacts:

- Bridgewater
- Carolina Crossing
- North Village
- Heather Glen
- The Retreat
- Creekside Point
- Bloom Road Estates
- Lafayette Park

The following Brunswick County subdivisions would experience impacts to community cohesion:

- Wildwood Village
- Brunswick Plantation
- Springmill Plantation
- Meadowlands/Savannah Lakes
- Crow Creek
- Carolina Shores Golf and Country Club
- Carolina Shores North
- Beacon Townes
- Ocean Forest
- Eagle Run
- Starboard Knoll

Relocation reports concluded that, based on the current market, sufficient resources are available to relocate the displacees in both South Carolina and North Carolina. Additional phone interviews with Horry County also revealed sufficient affordable housing availability. Horry County Housing Authority confirmed there was sufficient housing available with approximately 260 total units within the county. Based on the location of the alternatives, the majority of units within the Horry County Housing Authority's jurisdiction are located in the Conway area – outside of the DCIA. Brunswick County Homeless Coalition was contacted but did not respond (see Appendix D: Local Official Input Forms of *Community Impact Assessment*, STV, February 2023). Relocations are not expected to disrupt or remove the displacees from their churches, schools, and other community activities in either state.

A discussion of potential impacts to neighborhoods and community cohesion by Detailed Study Alternative is provided below. The relocated residences and businesses associated with the two Construction Phase 1 scenarios would not have cohesion impacts to established neighborhoods.

Alternative 1

Alternative 1 would have the second lowest number of residential relocations (total of 62). Along with Alternative 4, Alternative 1 would have the least impact on neighborhood cohesion.

Alternative 1A

Alternative 1A would have the second highest number of residential relocations (total of 140). Both Alternative 1A and Alternative 4A would displace parcels in the Wildwood Village and Starboard Knoll developments.

Alternative 2

Alternative 2 would have the third lowest number of residential relocations (total of 105). Alternative 2 would displace parcels along Hickman Road in the Crow Creek development.

Alternative 4

Alternative 4 would have the lowest number of residential relocations (total of 39). Along with Alternative 1, Alternative 4 would have the least impact on neighborhood cohesion.

Alternative 4A

Alternative 4A would have the fourth highest number of residential relocations (total of 118). Both Alternative 4A and Alternative 1A would displace parcels in the Wildwood Village and Starboard Knoll developments.

Alternative 7

Alternative 7 would have the highest number of residential relocations (total of 266). The proposed Alternative 7 interchange at Calabash Road would displace parcels in Springmill Plantation on Springmill Plantation Boulevard, Jarvis Lane, and Iredale Court. It would also relocate the existing entrances to both the Springmill Plantation and the Meadowlands subdivisions on Calabash Road, thereby also removing portions of the existing sidewalk network in these neighborhoods. This interchange would also displace parcels in the Meadowlands subdivision, as well as impact several holes on the Meadowlands Golf Course. The Alternative 7 alignment would also bisect Meadowbrook Lane between the Meadowlands and Savannah Lakes neighborhoods, thereby creating a barrier effect by removing direct access to the Meadowlands Golf Course clubhouse and community pool to Savannah Lakes residents on Meadowbrook Lane to the south of the alignment. With the bisecting of Meadowbrook Lane to the north of Savannah Lakes, it would also be necessary to create roadway connections from the Savannah Lakes community to Stanley Road and Tree Acres Circle in the Marlowtown community in order to provide access to Savannah Lakes. Alternative 7 would also displace parcels in the northern portion of the Eagle Run neighborhood on Shingletree Road. It would then continue on to cross the Crow Creek Golf Course, displacing apartments on South Crow Creek Drive and condominiums on Woodlands Way.

Alternative 8

Alternative 8 would have the third highest number of residential relocations (total of 130). Alternative 8 would displace parcels in the Carolina Shores Golf and Country Club subdivision at US 17, dead ending Gate 12 Road. This is a relatively small portion of the large subdivision. Alternative 8 would also displace parcels in Carolina Shores North, bisecting the neighborhood and creating a barrier to the community common area, basketball courts, clubhouse, picnic grounds, playground, and pool. Alternative 8 would impact most of the parcels in the Creekside Point development on Mineola Avenue, displacing the majority of the neighborhood inhabitants. Parcels within the Heather Glen development will be displaced as well. The proposed Alternative 8 interchange at US 17 would displace one townhouse unit in the Beacon Townes development. In addition, access to the development will be altered to the proposed new service road. Parcels would also be displaced in the Ocean Forest subdivision at this interchange. Lafayette Park would have one displacement along Little River Road at Hartwell Drive.

Neighborhood Servicing Facilities

In general, the more northern Detailed Study Alternatives would have the least impact on neighborhood serving retail facilities, whereas the Detailed Study Alternatives that run along existing US 17 would displace more community facilities and businesses. Conversely, these northern Detailed Study Alternatives would tend to have more of an impact on rural crossroads community and family owned parcels.

As currently designed, the improved Carolina Bays Parkway Extension/SC 9 interchange with all of the Detailed Study Alternatives would require the relocation of the Santee Cooper electric substation for the Bay Tree subdivision in Horry County. The substation is located on Gusta Road in the southeast quadrant of the existing interchange.

The proposed interchange at S-111 with Alternatives 1, 1A, and 2 would impact Union Missionary Baptist Church and the Brooksville community area at S-111 and SC 57.

Alternatives 1A and 4A would impact the Longwood community. The proposed NC 904 interchange near Russtown Road would alter existing access along NC 904 near the Grissettown-Longwood Volunteer Fire Department and Rescue Station, making access an important issue in this area. The Greater Tabernacle Church would also be displaced.

All of the Detailed Study Alternatives except Alternatives 1A and 4A would impact key neighborhood serving retail businesses and places of gathering along the US 17 corridor at the proposed interchanges with both NC 904 and Ocean Isle Beach Road, including McDonald's, a BP gas station, Butcher of Brunswick, Lucky Day Produce and surrounding Holden family properties, Peoples Funeral Home, and Green Oyster Company, a seafood wholesaler unique to the area.

Alternative 2 would impact the most neighborhood serving facilities along US 17, with an additional impact to Pleasant Grove Missionary Baptist Church, Dollar General, Holy Bethel Fire Baptized Holiness Church, and Breath of Life Ministries.

Alternative 8 would also relocate the CVS pharmacy on Calabash Road at US 17, which is used by area neighborhoods.

All of the Detailed Study Alternatives using CP1 – S1 only would relocate the Circle K gas station/ convenience store in the northwest corner of the US 17/S-50 intersection in Little River, as well as an embroidery shop adjacent to the convenience store. All of the Detailed Study Alternatives using CP1 – S1 only also have the potential to impact two cemeteries; one associated with Mt. Calvary No. 2 Missionary Baptist Church near the intersection of S-111 with the new extension of Carolina Bays Parkway and one associated with Little River United Methodist Church at the US 17/S-50 intersection in Little River.

All of the Detailed Study Alternatives using CP1 – S2 only (with the exception of Alternative 8) would relocate Smith's Heating and AC in the southeast corner of the Hickman Road/Calabash Road intersection.

Crossroads Communities and Family Owned Properties

Alternatives 1, 1A, and 2 would disrupt the agricultural crossroads community (Brooksville) in the vicinity of the Wampee Road (S-57)/Little River Road (S-111) intersection by altering the existing roadway connections and associated patterns of interaction within this area, including altering the alignment of and access to Union Church Road, S-57, and S-111 at the proposed S-111 interchange. The elevated Carolina Bays Parkway Extension structure at the interchange would have an aesthetic impact to the rural area with visual and noise effects. The proposed S-111 interchange would also displace or impact several churches, businesses, and residences, including Union Missionary Baptist Church, Grace Christian Fellowship, Dollar General, Power House Church of Christ, and several additional small businesses in the vicinity of the Brooksville community.

Alternatives 1, 1A, and 2 would also bisect Frank Gore Road, a rural residential corridor within the Brooksville community that currently extends for approximately three-quarter mile north from S-57, resulting in the isolation of residences that would remain on the north side of the proposed project. Noise barriers are proposed along Frank Gore Road in the area of Division Lane and Magalene Lane extending west to S-111. Worthams Cutoff Road would also be affected in a similar way, losing the existing diret access to S-57.

If CP1 – S1 were constructed, it is possible the current development on S-111 near and to the north of the proposed Carolina Bays Parkway Extension/S-111 T-intersection, as proposed with all of the Detailed Study Alternatives under CP1 – S1, could eventually change to more commercial and retail development in the future as a result of terminating the proposed controlled-access freeway at the uncontrolled S-111 roadway.

The Hickman Crossroads community in Brunswick County in the vicinity of the Hickman Road/Calabash Road/Ash Little River Road intersection would be impacted if CP1 – S2 is constructed. Most of the property surrounding the intersection is under ownership by various members of the Hickman Family and Hickman's Seafood, which appeared to operate only seasonally based on observed vacancy during field review in February of 2017. A small Carrier HVAC service center (Smith's Heating and AC) is also located in the southwestern quadrant of the intersection. Development surounding the intersection is otherwise comprised of single family residential and agricultural uses. Several homes would be relocated in this community, as well as Hickman's Seafood, the HVAC business, and a church, as part of the turn-lane additions and shoulder improvements to the existing roadways required with CP1 – S2 (with the exception of Alternative 8).

4.1.2 Community Facilities and Services

Table 4-1 summarizes the impacts to community facilities within the study area for each of the seven Detailed Study Alternatives and the impacted community facilities are shown on Figure 19. The following section discusses the potential impacts to community facilities with each of the Detailed Study Alternatives in more detail. A detailed discussion of impacts to community facilities and services is provided in the *Community Impact Assessment* (STV, February 2023).

Alternative 1

South Carolina: The proposed interchange at S-111 with Alternative 1 would relocate Union Missionary Baptist Church and would also have property impacts at Grace Christian Fellowship. Alternative 1 would also have property impacts at Pleasant Plain Baptist Church and Power House Church of Christ, both located on Wampee Road in Horry County. Alternative 1 would also have property impacts at Mt. Calvary No. 2 Missionary Baptist Church (on S-111), Little River United Methodist Church (at the Mineola Avenue/US 17 intersection), and Little River House of God in Christ (on Mineola Avenue). All of the Detailed Study Alternatives would have the same impacts on Mt. Calvary No. 2 Missionary Baptist Church Cemetery (on S-111) and Little River United Methodist Church Cemetery (at the Mineola Avenue/US 17 intersection) in Horry County. Alternative 1 would relocate the main office for Little River Water and Sewerage Company (on Little River Road) and would have property impacts at the Horry County Recycling and Solid Waste Convenience Center (on S-111).

North Carolina: Alternative 1 would have property impacts at four churches: Beach Assembly of God on Bliss Road; Kingdom Hall of Jehovah's Witnesses on US 17; Andrews Chapel Global Methodist Church on Hickman Road; and Beulah Baptist Church on Hickman Road. Alternative 1 would impact Blanton Cemetery, Brooks Cemetery, Brunswick Memorial Gardens Cemetery, and a purported cemetery in Brunswick County. Access to the Brunswick County Visitor Center (operated by the State of North Carolina) would be altered with all of the Detailed Study Alternatives. The existing US 17 Shallotte Bypass exit ramp directly to the Visitor Center located south of the NC 130 interchange would be removed, and access to the site would be provided only via the existing driveway on NC 130. Alternative 1 would have property impacts at one assisted living facility – Coastal Pointe Assisted Living and Memory Care on US 17 to the east of Ocean Isle Beach Road. Two additional community facilities

Table 4-1. Community Facility Impacts with Detailed Study Alternatives

Resource Type	Detailed Study Alternatives						
	1	1A	2	4	4A	7	8
South Carolina							
Assisted Living Facilities	None	None	None	None	None	None	None
Cemeteries*	2	2	2	4	4	3	2
Churches	1 relocation and 6 property impacts	1 relocation and 6 property impacts	1 relocation and 6 property impacts	5 property impacts	5 property impacts	5 property impacts	5 property impacts
Civic Facilities	1 relocation and 1 property impact	1 relocation and 1 property impact	1 relocation and 1 property impact	1 property impact	1 property impact	1 property impact	1 property impact
Other Community Facilities	None	None	None	None	None	None	None
North Carolina							
Assisted Living Facilities	1 property impact	None	1 property impact	1 property impact	None	1 property impact	1 property impact
Cemeteries*	4	4	4	4	4	3	4
Churches	4 property impacts	1 relocation and 2 property impacts	4 relocations and 5 property impacts	4 property impacts	1 relocation and 2 property impacts	2 relocations and 5 property impacts	2 relocations and 4 property impacts
Civic Facilities	1 property impact	2 property impacts	1 property impact	1 property impact	2 property impacts	1 property impact	1 property impact
Other Community Facilities	1 relocation and 1 property impact	1 property impact	1 relocation and 1 property impact	1 relocation and 1 property impact	1 property impact	1 relocation	1 relocation

*Exact boundaries of cemeteries are not known at this time. The cemeteries noted in this table represent those for which the parcel is located within the functional design slope stake limits plus 40-foot buffer for the Detailed Study Alternatives. These cemeteries could potentially be impacted, partially or completely, by the construction of the noted alternative.

that Alternative 1 would impact are Peoples Funeral Home on the north side of US 17 just east of Ocean Isle Beach Road (relocation) and Indigo Farms Market on Hickman Road (property impact).

Alternative 1A

South Carolina: The proposed interchange at S-111 with Alternative 1A would have the same impacts at Union Missionary Baptist Church and Grace Christian Fellowship as Alternative 1. Alternative 1A would have the same impacts as Alternative 1 at Pleasant Plain Baptist Church and Power House Church of Christ. Alternative 1A would also have property impacts at Mt. Calvary No. 2 Missionary Baptist Church

(on S-111), Little River United Methodist Church (at the Mineola Avenue/US 17 intersection), and Little River House of God in Christ (on Mineola Avenue). All of the Detailed Study Alternatives would have the same impacts on Mt. Calvary No. 2 Missionary Baptist Church Cemetery (on S-111) and Little River United Methodist Church Cemetery (at the Mineola Avenue/US 17 intersection) in Horry County. Alternative 1A would relocate the main office for Little River Water and Sewerage Company (on Little River Road) and would have property impacts at the Horry County Recycling and Solid Waste Convenience Center (on S-111).

North Carolina: The proposed interchange at NC 904 with Alternative 1A would relocate Greater Tabernacle Church on NC 904. Alternative 1A would also have property impacts at Andrews Chapel Global Methodist Church and Beulah Baptist Church, both located on Hickman Road. Alternative 1A would impact Blanton Cemetery, Angela Faye Cemetery, Piggott Cemetery, and a purported cemetery in Brunswick County. Alternative 1A would have property impacts at the Grissettown-Longwood Volunteer Fire Department (VFD) and Rescue Station (Station 31). NC 904 in front of the station driveway would be relocated approximately 140 feet to the southwest to accommodate the proposed Carolina Bays Parkway Extension/NC 904 interchange. As a result, the driveway for the station would have to be extended by approximately 140 feet to reconnect with relocated NC 904. The relocation of Russtown Road to the north of the station would also require a construction easement across the northern portion of the parcel, but the station would not be impacted. A driveway could be added from the station to relocated Russtown Road to the north, if desired by the VFD. All of the Detailed Study Alternatives would have the same impacts to the Brunswick County Visitor Center as discussed above for Alternative 1. Alternative 1A would also have property impacts on Indigo Farms Market on Hickman Road.

Alternative 2

South Carolina: The proposed interchange at S-111 with Alternative 2 would have the same impacts at Union Missionary Baptist Church and Grace Christian Fellowship as Alternatives 1 and 1A. Alternative 2 would have the same impacts as Alternatives 1 and 1A at Pleasant Plain Baptist Church and Power House Church of Christ. Alternative 2 would also have property impacts at Mt. Calvary No. 2 Missionary Baptist Church (on S-111), Little River United Methodist Church (at the Mineola Avenue/US 17 intersection), and Little River House of God in Christ (on Mineola Avenue). All of the Detailed Study Alternatives would have the same impacts on Mt. Calvary No. 2 Missionary Baptist Church Cemetery (on S-111) and Little River United Methodist Church Cemetery (at the Mineola Avenue/US 17 intersection) in Horry County. Alternative 2 would relocate the main office for Little River Water and Sewerage Company (on Little River Road) and would have property impacts at the Horry County Recycling and Solid Waste Convenience Center (on S-111).

North Carolina: Alternative 2 would relocate four churches: Breath of Life Ministries on US 17; Holy Bethel Fire Baptized Holiness Church on US 17; Pleasant Grove Missionary Baptist Church on US 17; and Thomasboro Free Will Baptist Church on Pea Landing Road. It would also have property impacts at five churches: Beach Assembly of God on Bliss Road; Kingdom Hall of Jehovah's Witnesses on US 17; River of Life Baptist Church on US 17; Andrew's Chapel Global Methodist Church on Hickman Road; and Beulah Baptist Church on Hickman Road. Alternative 2 would impact Holy Bethel Fire Baptized Holiness Church Cemetery, Blanton Cemetery, Brooks Cemetery, and Brunswick Memorial Gardens Cemetery in Brunswick County. All of the Detailed Study Alternatives would have the same impacts to the Brunswick County Visitor Center as discussed above for Alternative 1. Alternative 2 would have property impacts at one assisted living facility – Coastal Pointe Assisted Living and Memory Care on US 17 to the east of Ocean Isle Beach Road. Two additional community facilities that Alternative 2 would impact are Peoples

Funeral Home on the north side of US 17 just east of Ocean Isle Beach Road (relocation) and Indigo Farms Market on Hickman Road (property impact).

Alternative 4

South Carolina: Alternative 4 would have property impacts at Mt. Calvary No. 2 Missionary Baptist Church (on S-111), Little River United Methodist Church (at the Mineola Avenue/US 17 intersection), Little River House of God in Christ (on Mineola Avenue), Grace Christian Fellowship (on Wampee Road), and Pleasant Plain Baptist Church (on Wampee Road). Alternative 4 would impact Permenter-Bell Cemetery and Tharp Cemetery in Horry County. All of the Detailed Study Alternatives would have the same impacts on Mt. Calvary No. 2 Missionary Baptist Church Cemetery (on S-111) and Little River United Methodist Church Cemetery (at the Mineola Avenue/US 17 intersection) in Horry County. Alternative 4 would have property impacts at the Horry County Recycling and Solid Waste Convenience Center (on S-111).

North Carolina: Alternative 4 would have property impacts at four churches: Beach Assembly of God on Bliss Road; Kingdom Hall of Jehovah's Witnesses on US 17; Andrews Chapel Global Methodist Church on Hickman Road; and Beulah Baptist Church on Hickman Road. Alternative 4 would impact Blanton Cemetery, Brooks Cemetery, Brunswick Memorial Gardens Cemetery, and a purported cemetery in Brunswick County. All of the Detailed Study Alternatives would have the same impacts to the Brunswick County Visitor Center as discussed above for Alternative 1. Alternative 4 would have property impacts at one assisted living facility – Coastal Pointe Assisted Living and Memory Care on US 17 to the east of Ocean Isle Beach Road. Two additional community facilities that Alternative 4 would impact are Peoples Funeral Home on the north side of US 17 just east of Ocean Isle Beach Road (relocation) and Indigo Farms Market on Hickman Road (property impact).

Alternative 4A

South Carolina: Alternative 4A would have property impacts at Mt. Calvary No. 2 Missionary Baptist Church (on S-111), Little River United Methodist Church (at the Mineola Avenue/US 17 intersection), Little River House of God in Christ (on Mineola Avenue), Grace Christian Fellowship (on Wampee Road), and Pleasant Plain Baptist Church (on Wampee Road). Alternative 4A would have the same impacts as Alternative 4 on Permenter-Bell Cemetery and Tharp Cemetery. All of the Detailed Study Alternatives would have the same impacts on Mt. Calvary No. 2 Missionary Baptist Church Cemetery (on S-111) and Little River United Methodist Church Cemetery (at the Mineola Avenue/US 17 intersection) in Horry County. Alternative 4A would have property impacts at the Horry County Recycling and Solid Waste Convenience Center (on S-111).

North Carolina: The proposed interchange at NC 904 with Alternative 4A would relocate Greater Tabernacle Church on NC 904. Alternative 4A would also have property impacts at Andrews Chapel Global Methodist Church and Beulah Baptist Church, both located on Hickman Road. Alternative 4A would impact Blanton Cemetery, Angela Faye Cemetery, Piggott Cemetery, and a purported cemetery in Brunswick County. Alternative 4A would have the same property impacts as Alternative 1A at the Grissettown-Longwood VFD and Rescue Station (Station 31). All of the Detailed Study Alternatives would have the same impacts to the Brunswick County Visitor Center as discussed above for Alternative 1. Alternative 4A would also have property impacts on Indigo Farms Market on Hickman Road.

Alternative 7

South Carolina: Alternative 7 would have property impacts at Mt. Calvary No. 2 Missionary Baptist Church (on S-111), Little River United Methodist Church (at the Mineola Avenue/US 17 intersection), Little River House of God in Christ (on Mineola Avenue), Grace Christian Fellowship (on Wampee Road), and Pleasant Plain Baptist Church (on Wampee Road). Alternative 7 would impact Permenter-Bell Cemetery in Horry County. All of the Detailed Study Alternatives would have the same impacts on Mt. Calvary No. 2 Missionary Baptist Church Cemetery (on S-111) and Little River United Methodist Church Cemetery (at the Mineola Avenue/US 17 intersection) in Horry County. Alternative 7 would have property impacts at the Horry County Recycling and Solid Waste Convenience Center (on S-111).

North Carolina: Alternative 7 would relocate Breath of Life Ministries and Holy Bethel Fire Baptized Holiness Church, both on US 17. It would also have property impacts at five churches: Beach Assembly of God on US 17; Kingdom Hall of Jehovah's Witnesses on US 17; River of Life Baptist Church on US 17; Andrews Chapel Global Methodist Church on Hickman Road; and Beulah Baptist Church on Hickman Road. Alternative 7 would impact Holy Bethel Fire Baptized Holiness Church Cemetery, Brooks Cemetery, and Brunswick Memorial Gardens Cemetery in Brunswick County. All of the Detailed Study Alternatives would have the same impacts to the Brunswick County Visitor Center as discussed above for Alternative 1. Alternative 7 would have property impacts at one assisted living facility – Coastal Pointe Assisted Living and Memory Care on US 17 to the east of Ocean Isle Beach Road. Alternative 7 would also relocate Peoples Funeral Home on the north side of US 17 just east of Ocean Isle Beach Road.

Alternative 8

South Carolina: Alternative 8 would have property impacts at Mt. Calvary No. 2 Missionary Baptist Church (on S-111), Little River United Methodist Church (at the Mineola Avenue/US 17 intersection), Little River House of God in Christ (on Mineola Avenue), Grace Christian Fellowship (on Wampee Road), and Pleasant Plain Baptist Church (on Wampee Road). All of the Detailed Study Alternatives would have the same impacts on Mt. Calvary No. 2 Missionary Baptist Church Cemetery (on S-111) and Little River United Methodist Church Cemetery (at the Mineola Avenue/US 17 intersection) in Horry County. Alternative 8 would have property impacts at the Horry County Recycling and Solid Waste Convenience Center (on S-111).

North Carolina: Alternative 8 would relocate Breath of Life Ministries and Holy Bethel Fire Baptized Holiness Church, both on US 17. It would also have property impacts at four churches: Beach Assembly of God on US 17; Kingdom Hall of Jehovah's Witnesses on US 17; River of Life Baptist Church on US 17; and Thomasboro Free Will Baptist Church on Pea Landing Road. Alternative 8 would impact Holy Bethel Fire Baptized Holiness Church Cemetery, Beck Cemetery, Brooks Cemetery, and Brunswick Memorial Gardens Cemetery in Brunswick County. All of the Detailed Study Alternatives would have the same impacts to the Brunswick County Visitor Center as discussed above for Alternative 1. Alternative 8 would have property impacts at one assisted living facility – Coastal Pointe Assisted Living and Memory Care on US 17 to the east of Ocean Isle Beach Road. Alternative 8 would also relocate Peoples Funeral Home on the north side of US 17 just east of Ocean Isle Beach Road.

All Detailed Study Alternatives Using CP1 – S1 Only

Some of the community facility impacts discussed above in Horry County would occur with all of the Detailed Study Alternatives using CP1 – S1 only. The impacts to Mt. Calvary No. 2 Missionary Baptist Church and Cemetery, Little River United Methodist Church and Cemetery, Little River House of God in Christ, Pleasant Plain Baptist Church, and Grace Christian Fellowship would only occur with CP1 – S1.

All Detailed Study Alternatives (Except for Alternative 8) Using CP1 – S2 Only

The impacts discussed above to Andrew's Chapel Global Methodist Church and Beulah Baptist Church in Brunswick County would occur with all of the Detailed Study Alternatives (except for Alternative 8) using CP1 – S2 only.

According to representatives for Horry County Emergency Management, the proposed project would potentially have a low impact overall on local emergency services within the Horry County portion of the project study area. Representatives for Brunswick County Emergency Services also indicated that the project would potentially have a low impact overall on local emergency services for the Brunswick County portion of the study area. However, Brunswick County representatives noted that any road closures or detours during high occupancy holiday periods (e.g., Fourth of July holiday) would cause concern. Potential impacts to emergency management resources are closely correlated with potential impacts to access, accessibility, and mobility, and would, therefore, be expected as a result of the proposed project with any of the Detailed Study Alternatives. However, based on the 400-foot corridor widths for all of the Detailed Study Alternatives, the nature and extent of potential project impacts on emergency management and response resources does not vary notably across the Detailed Study Alternatives. The proposed project would likely temporarily impact response times for emergency services during construction due to detours and lane closures. Upon project completion, the flow of traffic within the study area would be improved. As such, the project is expected to provide a benefit to emergency response, access to emergency facilities, and emergency evacuation.

According to representatives for Horry County Schools, construction of the proposed project would have a high impact on school transportation, especially on major corridors (S-57, US 17, SC 9, SC 90, SC 179, S-111, S-50) between the hours of 6:00 AM and 8:30 AM, as well as between 2:00 PM to 4:00 PM, if lanes are closed. All of the Detailed Study Alternatives would impact Little River Road (S-111) at a proposed interchange or intersection in one of three locations. In addition, Alternative 8 would impact S-50 (Mineola Avenue) at a proposed interchange near Lewisfield Road and Pine Ere Acres subdivision. Alternatives 1, 1A, and 2 impact S-57 at S-111 – both major corridors for school transportation. All of the Detailed Study Alternatives using CP1 – S2 would be north of dense development along US 17 in the Little River area, where school bus routes run. However, the Detailed Study Alternatives using CP1 – S1 would impact Mineola Avenue between the S-111 and US 17 intersections, which is an area of dense development in the Little River area where school bus routes run, although the Mineola Avenue/US 17 intersection would be improved with this scenario.

Representatives for Brunswick County Schools indicated construction of the proposed project would have a moderate impact on school transportation since US 17 is the main artery for buses to and from school. Alternatives 1A and 4A are located the furthest to the north and would have the least impact to US 17 and bus routes, whereas Alternative 8 would impact almost the entire length of US 17 in the Brunswick County portion of the study area, so it would have the most impact to bus routes.

4.1.3 Relocation of Homes and Businesses

NCDOT prepared combined relocation reports for the South Carolina and North Carolina portions of the Detailed Study Alternatives in January of 2022 (see Appendix C). NCDOT subsequently prepared relocation reports for the two Construction Phase 1 scenarios in July of 2024 (see Appendix C). All of the Detailed Study Alternatives would result in the relocation of homes and businesses. Total anticipated residential and business displacements for each of the seven Detailed Study Alternatives are shown in Table 4-2.

Table 4-2. Residential and Business Relocations with Detailed Study Alternatives

Relocations	Detailed Study Alternatives													
	1		1A		2		4		4A		7		8	
	Total		Total		Total		Total		Total		Total		Total	
	SC	NC	SC	NC	SC	NC	SC	NC	SC	NC	SC	NC	SC	NC
Residential	62		140		105		39		118		266		130	
	28	34	28	112	28	77	4	35	4	114	4	262	24	106
Business/ Nonprofit	42		15		52		37		11		41		54	
	7	35	7	8	7	45	3	34	3	8	3	38	3	51

Two of the residential relocations and one business relocation shown for each Detailed Study Alternative in Table 4-2 are unique to CP1 – S1, and three of the residential relocations and one business relocation shown for each Detailed Study Alternative are unique to CP1 – S2. The relocation reports concluded that sufficient resources are available to relocate the displacees in both South Carolina and North Carolina. Relocation is not expected to disrupt or remove the displacees from their churches, schools, and other community activities in either state. The relocation programs in both states will be conducted in accordance with the Federal Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Act) (49 CFR 24, see Appendix C), as amended (Public Law 91-646), and/or the North Carolina Relocation Assistance Act (GS-133-5 through 133-18) in North Carolina. The relocation programs are designed to provide assistance to displaced persons in finding replacement property in which to live or to do business. Relocation of displaced persons will be offered in areas at least as desirable in regard to public utilities and commercial facilities. Rent and sale prices of replacement housing offered will be within the financial means of the families and individuals displaced and reasonably accessible to their places of employment. SCDOT and NCDOT will provide the displacees full benefits accorded under the Act. This will include fair market value for the acquired property in addition to equitable compensation normally associated with relocation. All other benefits available under the Act will be carefully explained to the individual. As is the policy of SCDOT and NCDOT, in response to the non-discrimination requirements in Title VI of the Civil Rights Act of 1964, the relocation advisory assistance shall be provided to all eligible persons without discrimination.

4.1.4 Economic Effects

Direct impacts to business and economic resources are anticipated as a result of the proposed Carolina Bays Parkway Extension under any of the seven Detailed Study Alternatives. Resources within the study area include representation from multiple sectors of the local economy. Relative to the particular context of the study area for the proposed project, business and economic resources have been grouped/defined as follows for this comparative assessment:

- **Recreation, Tourism, and Entertainment.** Hereinafter referred to collectively as "tourism," this sector of business and economic resources together serves to attract visitors to the area and provide non-retail entertainment during their stay. These resources are characteristically unique to the area, contributing to its sense of place and generally irreplaceable. For this reason, they are also considered notable community features and project impacts to these resources are likely to

generate local controversy. They are "destination oriented," meaning all patrons (local, non-local, seasonal, non-seasonal, etc.) are likely to travel a longer distance or indirect route to access them.

- **Commercial, Retail, Restaurant, and Medical.** Hereinafter referred to collectively as "commercial," this sector of business and economic resources provides essential goods and services for local residents as well as some visitors (e.g., food, prescriptions, doctors' offices, hardware, personal care, etc.). These resources may also provide retail-based entertainment. While they may be "destination oriented" to an extent, such as preferred pharmacies and salons, doctors, or the neighborhood hardware store, they are not intrinsically unique and are characteristically replaceable/ interchangeable.
- **Industrial.** Within the context of the proposed project, this group includes traditional light industrial and highway commercial development types such as: warehousing; commercial storage; gas and convenience stations; construction materials and services; mechanical repair services; etc. These business and economic resources are characteristically auto-centric with the ideal location being along arterial roadway facilities that either are, or could be, designated truck routes. They are also replaceable.
- **Agriculture.** This category recognizes agriculture as a distinct sector of economic and business resources. Agritourism resources are characteristically very similar to recreation, tourism, and entertainment resources; however, they are grouped with other agricultural resources since they are typically located within and/or in direct association with an active farming operation, and the long-term sustainability of their continued operation is directly correlated with the health of the agricultural economy. Within the context of the proposed project, all agricultural resources contribute to the local sense of place and are irreplaceable.

4.1.4.1 South Carolina Economic Effects

Tourism: The large majority of existing business and economic resources in the tourism sector are concentrated along the US 17 corridor through Little River; therefore, no adverse impacts in the form of relocations or operational impacts to existing tourism businesses would be expected under all alternatives in South Carolina. Project benefits in the form of improved accessibility would be expected as the proposed facility would remove through traffic from US 17 where the majority of existing resources are located, reducing total traffic volumes and congestion. With no potential adverse impacts expected to existing tourism resources, the proposed project under all alternatives in South Carolina would be expected to benefit this sector of the local economy.

Commercial and Industrial: The large majority of existing business and economic resources in the commercial and industrial sectors are concentrated along the SC 9, US 17, and SC 90 highway corridors in Little River. The number of potential relocations and/or operational impacts to businesses in these sectors, when considered relative to the stock of comparable properties available for relocation of commercial and industrial businesses, would be low. The same accessibility benefits expected for tourism resources would also extend to commercial and industrial resources under all alternatives in South Carolina. Additional benefits to industrial resources as well as some commercial resources would be expected in the form of improved mobility of goods through the study area. The availability of a bypass route for truck traffic serving industrial and commercial resources would be expected to provide mobility benefits for all existing businesses in these sectors. With a low level of potential adverse impacts expected to existing commercial and industrial resources, the proposed project under all alternatives in South Carolina would be expected to benefit these sectors of the local economy.

Agriculture: The summary level of potential impacts to existing agricultural resources would be high under all of the Detailed Study Alternatives in South Carolina.

4.1.4.2 North Carolina Economic Effects

Alternatives 1 and 4

Tourism: The large majority of existing tourism resources are located along US 17 or along arterial facilities with direct connection to US 17 in Brunswick County. No adverse impacts in the form of relocations or operational impacts to existing tourism resources would be expected under Alternatives 1 and 4 in North Carolina. Potential accessibility benefits would be consistent with those expected under South Carolina alternative segments as the proposed freeway facility would remove through traffic from US 17 and connecting roadways where the majority of existing tourism resources are located, reducing total traffic volumes and congestion in the vicinity of resources. With no potential adverse impacts expected to tourism resources, the proposed project under Alternatives 1 and 4 in North Carolina would be expected to benefit this sector of the local economy.

Commercial: The large majority of existing commercial resources are concentrated along the US 17 corridor within the Brunswick County portion of the study area, with clusters of resources also located along other arterial roadway facilities that connect to US 17. Adverse impacts in the form of individual business relocations and/or right-of-way impacts would be expected. The majority of adverse impacts would occur along the US 17 corridor between NC 904 and the northern project terminus at NC 130 (the existing location portion of Alternatives 1 and 4). The potential for adverse impacts to the assisted living/rehabilitation center located at the intersection of Ash Little River Road and No. 5 School Road, within the new location portion of Alternatives 1 and 4, would be individually notable. Across Alternatives 1 and 4, a moderate-high number of commercial businesses would be adversely impacted. This is notably tempered by the ample stock of comparable commercial properties for relocation or redevelopment of displaced businesses. Project benefits under Alternatives 1 and 4 would further temper the adverse impacts, including improved accessibility of commercial resources similar to those expected for tourism resources. Additional project benefits in the form of enhanced visibility would be expected for businesses located along US 17 between NC 904 and NC 130. As these businesses would be located along future frontage roads under the proposed Alternatives 1 and 4, they would benefit from enhanced visibility/exposure from the future bypass facility. With a moderate-high level of potential adverse impacts expected to existing commercial resources, tempered by relocation opportunities and project benefits, the proposed project under Alternatives 1 and 4 in North Carolina would be expected to result in a moderate level of impacts to commercial resources.

Industrial: The large majority of existing industrial resources are concentrated along the US 17 and NC 904 highway corridors in Brunswick County, with small clusters located along other arterial roadway facilities that connect to US 17. The nature and extent of potential adverse impacts under Alternatives 1 and 4 are consistent with those expected for commercial resources. They are also notably tempered by the ample stock of comparable industrial properties for relocation or redevelopment of displaced businesses. The accessibility benefits expected for tourism and commercial resources under Alternatives 1 and 4 would also extend to industrial resources, and additional benefits in the form of improved mobility of goods through the study area would be expected. While the construction of a bypass route for truck traffic serving industrial resources (as well as some commercial resources) would be expected to provide some level of mobility benefits for all industrial businesses within the study area, the highest level of benefits would be expected for those businesses located in closest proximity to the future bypass facility interchanges. Mobility benefits under Alternatives 1 and 4 would therefore be very

high for industrial resources currently located along US 17 between NC 904 and NC 130, and for resources located on the NC 130 corridor in Shallotte; while mobility benefits for industrial resource located elsewhere within the study area (e.g., US 17, NC 904/Seaside Road, Koolabrew Industrial Park) may be limited by the circuitous route north and west of existing US 17. With a moderate-high level of potential adverse impacts expected to existing industrial resources, tempered by relocation opportunities and project benefits, the proposed project would be expected to result in a moderate level of impacts to this sector under Alternatives 1 and 4 in North Carolina.

Agriculture: The summary level of potential impacts to existing agricultural resources would be very high under Alternatives 1 and 4 in North Carolina.

Alternative 1A and 4A

Tourism: The potential adverse and beneficial project impacts that would be expected to tourism resources under Alternatives 1A and 4A are consistent with those expected under Alternatives 1 and 4 in North Carolina: a net benefit for the tourism sector of the local economy.

Commercial: Considering the spatial distribution of existing commercial resources in Brunswick County, as described previously, adverse impacts in the form of relocations and/or or operational impacts would be low-moderate overall under Alternatives 1A and 4A. The same accessibility benefits expected for tourism resources would also extend to commercial resources under Alternatives 1A and 4A. With a low-moderate level of potential adverse impacts expected, tempered by accessibility benefits, a low level of impact would be expected to this sector of the local economy under Alternatives 1A and 4A in North Carolina.

Industrial: Considering the spatial distribution of existing industrial resources in Brunswick County, as described previously, adverse impacts in the form of relocations and/or or operational impacts would be low-moderate under Alternatives 1A and 4A. Adverse impacts to industrial resources would primarily be limited to the existing cluster of businesses located at the NC 904/Russtown Road intersection where an interchange is proposed under Alternatives 1A and 4A. Adverse impacts would be tempered by the available stock of comparable industrial properties for relocation or redevelopment of displaced businesses. Project benefits would further temper adverse impacts, including accessibility benefits as well as mobility benefits for industrial resources. While the construction of a bypass route for truck traffic serving industrial resources (as well as some commercial resources) would be expected to provide some level of mobility benefits for all industrial businesses within the study area, the highest level of benefits would be expected for those businesses located in closest proximity to the future bypass facility interchanges. Mobility benefits under Alternatives 1A and 4A would therefore be very high for industrial resources currently located on the NC 130 corridor in Shallotte and for any resources at the existing NC 904/Russtown Road intersection that are not relocated; while mobility benefits for industrial resources located elsewhere within the study area (e.g., US 17, NC 904/Seaside Road, Koolabrew Industrial Park), may be limited by the circuitous route north and west of existing US 17. With a low-moderate level of potential adverse impacts expected to existing industrial resources, tempered by relocation opportunities and project benefits, the proposed project would be expected to result in a low level of impacts to this sector under Alternatives 1A and 4A in North Carolina.

Agriculture: The summary level of potential impacts to existing agricultural resources would be very high under Alternatives 1A and 4A in North Carolina.

Alternative 2

Tourism: The potential adverse and beneficial project impacts that would be expected to tourism resources under Alternative 2 are consistent with those expected under Alternatives 1, 1A, 4, and 4A in North Carolina: a net benefit for the tourism sector of the local economy.

Commercial: Considering the spatial distribution of existing commercial resources in Brunswick County, as described, the level of adverse impacts expected to commercial resources under Alternative 2 would generally be consistent with the level of adverse impacts expected under Alternatives 1 and 4: a moderate-high number of relocations and/or operational impacts to commercial resources. The majority of adverse impacts would occur along the US 17 corridor between Hickman Road and the northern project terminus at NC 130. Note there is a very limited number of existing commercial resources located along US 17 between Hickman Road and NC 904, thus the number of potential relocations and/or operational impacts that would be expected under Alternative 2 is consistent with those expected under Alternatives 1 and 4. The moderate-high number of commercial relocations would be consistently tempered by the available stock of comparable commercial properties for relocation or redevelopment of displaced businesses, and project benefits that are consistent with those expected under Alternatives 1 and 4 would further temper adverse impacts. With a moderate high level of potential adverse impacts expected to existing commercial resources, tempered by ample relocation opportunities and project benefits, the proposed project would be result in a moderate level of impacts to this sector under Alternative 2 in North Carolina.

Industrial: Considering the spatial distribution of existing industrial resources in Brunswick County, as described, the level of adverse impacts expected to industrial resources under Alternative 2 would be somewhat higher than the level of adverse impacts expected under Alternatives 1 and 4. A high number of industrial relocations and/or operational impacts would be expected under Alternative 2, the majority of which would occur along the US 17 corridor between Hickman Road and the northern project terminus at NC 130. Note there are several existing industrial resources located along US 17 between Hickman Road and NC 904, thus the level of adverse impacts would be somewhat higher under Alternative 2 when compared to Alternatives 1 and 4. The number of potential relocations is, however, consistently tempered by the existing stock of comparable industrial properties that would be available for relocation or redevelopment of displaced businesses, and further tempered by accessibility benefits and mobility benefits. As the highest level of mobility benefits would be expected for those businesses located in closest proximity to the future bypass facility interchanges, mobility benefits under Alternative 2 would therefore be consistently high for the majority of industrial resources within the study area. With a high level of potential adverse impacts to existing industrial resources, tempered by ample relocation opportunities and a consistently high level of project benefits, the proposed project would be expected to result in a moderate level of impacts to this sector under Alternative 2 in North Carolina.

Agriculture: The summary level of potential impacts to existing agricultural resources would be high under Alternative 2 in North Carolina.

Alternative 7

Tourism: Adverse impacts to existing tourism resources would be very high under Alternative 7 due to the potential fragmentation of two golf course facilities: Meadowlands and Crow Creek. Golfing is known to be a critical component of the local tourism economy, attracting a high volume of visitors to the area each year. The potential adverse impacts to two golf course facilities under Alternative 7, all of which are open to visiting golfers, would summarily outweigh potential project benefits to existing

tourism resources located elsewhere within the study area. The proposed project would therefore result in a summarily very high level of potential impacts to tourism resources under Alternative 7 in North Carolina.

Commercial: The potential adverse and beneficial project impacts that would be expected to commercial resources under Alternative 7 are consistent with those expected under Alternative 2: a moderate-high level of potential adverse impacts, tempered by ample relocation opportunities and notable project benefits, resulting in a moderate level of impacts to commercial resources under Alternative 7 in North Carolina.

Industrial: The potential adverse and beneficial project impacts that would be expected to industrial resources under Alternative 7 are consistent with those expected under Alternative 2: a high level of potential adverse impacts, tempered by ample relocation opportunities and notable project benefits, resulting in a summarily moderate level of impacts to industrial resources under Alternative 7 in North Carolina.

Agriculture: The summary level of potential impacts to existing agricultural resources would be low under Alternative 7 in North Carolina.

Alternative 8

Tourism: The potential adverse and beneficial project impacts that would be expected to tourism resources under Alternative 8 are consistent with those expected under Alternatives 1, 1A, 4, 4A, and 2 in North Carolina: a net benefit for the tourism sector of the local economy.

Commercial: Considering the spatial distribution of existing commercial resources in Brunswick County, as described, adverse impacts to commercial resources under Alternative 8 would include a high number of potential relocations and/or operational impacts to resources located along the existing US 17 corridor. The high number of potential relocations would be notably tempered by the ample stock of comparable commercial properties available for relocation or redevelopment of displaced businesses. Adverse impacts would be further tempered by project benefits, including accessibility benefits for all commercial businesses as well as visibility/exposure benefits for resources currently located along US 17 that would be located along future frontage roads under Alternative 8. The greatest project benefits and the greatest project burdens to commercial resources under Alternative 8 would be borne by the same subset of commercial resources within the study area – those located along the existing US 17 corridor. The proposed project would therefore be expected to result in a moderate level of impacts to commercial resources under Alternative 8 in North Carolina.

Industrial: Due to the nature, number, and location of existing industrial resources along US 17 between Hickman Road and Calabash Road/Country Club Road, the potential adverse and beneficial project impacts that would be expected to industrial resources under Alternative 8 are generally consistent with those expected under Alternative 7 in North Carolina: a high level of potential adverse impacts, tempered by ample relocation opportunities and a consistently notable level of project benefits, resulting in a moderate level of impacts to industrial resources.

Agriculture: The summary level of potential impacts to existing agricultural resources would be low under Alternative 8 in North Carolina.

4.2 Land Use and Transportation Planning for Detailed Study Alternatives

4.2.1 Land Use Plans

Horry County *Imagine 2040 Comprehensive Plan* (December 2019) defines a future growth strategy that emphasizes the principles of sustainable development, efficiently expanding public infrastructure and services, and bringing people closer to job centers. The 2040 Plan also recognizes the need for providing better national connectivity to the Grand Strand region to help sustain the area's tourism-based economy, as well as to achieve necessary economic diversification and job creation. The 2040 Plan discusses the importance of the proposed Carolina Bays Parkway Extension and other planned roadways projects in helping to alleviate congestion on highways throughout the region. Each of the seven Detailed Study Alternatives for the proposed Carolina Bays Parkway Extension are compatible with local public policy since the public infrastructure improvements provided will substantially improve connectivity both within and to areas beyond the Grand Strand region, as well as help to reduce congestion and improve mobility along existing US 17 and other roadways within the Horry County portion of the study area.

One component of the Vision Statement from the *Brunswick County CAMA Core Land Use Plan* (2007) is the County's desire is to plan for and accommodate future growth while simultaneously maintaining the quality of life for current and future residents. One area that the County will focus on to meet this desire is to provide an infrastructure system that meets the present and future needs of its citizens, supports a vibrant economy, protects the environment, and adds to the overall quality of life. Each of the seven Detailed Study Alternatives for the proposed Carolina Bays Parkway Extension are compatible with local public policy since the proposed project will make needed improvements to the transportation system to help address the negative impacts (i.e., increased congestion and limited mobility) resulting from the tremendous growth that is occurring, and is expected to continue to occur, in the Brunswick County portion of the study area.

The goals and strategies developed as part of the *Carolina Shores CAMA Comprehensive Plan* (2018) are based on community concerns and desired outcomes. The eight goals developed for the plan focus on creating a sense of community while providing needed services and facilities. Although each of the seven Detailed Study Alternatives for the proposed Carolina Bays Parkway Extension are compatible with local public policy to provide needed transportation facilities, one concern in particular discussed in the plan is the impact the proposed project will have on the Town of Carolina Shores. The proposed project is mentioned as a significant regional transportation improvement that will have a direct impact on the timing of development throughout the Town's planning jurisdiction, depending on the selected route, but overall development is expected to be similar whether the project is built or not. The plan states that the Town will continue to monitor this project and will conduct all necessary corridor and small area planning once the final plans have been certified by NCDOT.

The *Town of Shallotte, NC: 2018 Land Use Plan* includes policies and recommendations that emphasize preserving existing residential and natural resources while promoting economic growth and supporting downtown revitalization. Shallotte is a commercial hub of southwestern Brunswick County, which leads to traffic congestion, especially during the summer tourist months. The plan states many of the area roadways are at or over traffic carrying capacity and recommends several transportation improvements for area roadways, ranging from the construction of new roads to roadway improvements aimed at improving traffic congestion and providing alternative routes around the downtown district. Each of the seven Detailed Study Alternatives for the proposed Carolina Bays Parkway Extension are compatible

with local public policy since the proposed project will make needed improvements to the transportation system to help reduce traffic congestion and improve mobility in the Shallotte area. The future land use proposed in the plan at the US 17 Bypass/NC 130 interchange (i.e., General Commercial), as well as at the US 17 Bypass/US 17 Business intersection (Commercial and High Density Residential), are also compatible with the proposed Carolina Bays Parkway Extension.

4.2.2 Transportation Plans

4.2.2.1 Compatibility with Highway Plans

Each of the seven Detailed Study Alternatives for the proposed Carolina Bays Parkway Extension are compatible with the GSATS MPO *2040 Metropolitan Transportation Plan Update* (2017). As discussed in Section 3.2.2.1, the Carolina Bays Parkway Extension to US 17 in North Carolina is a committed project in the Plan Update that is partially funded as part of the Horry County Road Improvement and Development Effort (RIDE) III referendum. The proposed project is also included in the Plan Update's lists of new construction recommendations for both the South Carolina and the North Carolina portions of the GSATS boundary. The recommended projects form the basis for the eventual list of prioritized projects selected for funding.

Each of the seven Detailed Study Alternatives for the proposed Carolina Bays Parkway Extension are also compatible with the September 2022 *Draft Brunswick County Comprehensive Transportation Plan* (Draft CTP). The Draft CTP lists the Carolina Bays Parkway Extension from the South Carolina State Line to US 17 at NC 130 as its number one priority highway recommendation. The Draft CTP indicates the proposed project is the construction of a new six-lane freeway extending from the Carolina Bays Parkway to the US 17 Shallotte Bypass. (Note that as discussed in Chapter 2 of this DEIS, the Brunswick County portion of the proposed Carolina Bays Parkway Extension is recommended to be a four-lane facility based on forecast 2045 design year traffic volumes.) The Draft CTP shows the proposed project on approximately the same alignment as Alternative 1A.

Project P029554 is included in SCDOT's approved *2024-2033 Statewide Transportation Improvement Program* (STIP) as an extension of existing Carolina Bays Parkway (SC 31) from its current northern terminus at SC 9 in Horry County, South Carolina to the North Carolina State Line. Project R-5876 is included in the approved *NCDOT 2024-2033 Current STIP* as the construction of a freeway on new location from the South Carolina State Line to US 17 Shallotte Bypass at NC 130 in Brunswick County, North Carolina.

4.2.2.2 Compatibility with Transit Plans

None of the seven Detailed Study Alternatives for the proposed Carolina Bays Parkway Extension conflict with the *Waccamaw Regional Transit & Coordination Plan* (2014), an appendix of the *South Carolina Multimodal Transportation Plan*. The alternatives also do not conflict with the transit element of the GSATS MPO *2040 Metropolitan Transportation Plan Update* (2017). Although Waccamaw Regional Transportation Authority (Coast RTA) does not currently operate fixed bus routes within the study area, the transit element of the Plan Update proposes transit projects that are aimed at improving regional and local services. The proposed project could benefit future expansion of Coast RTA services into Little River and northern Horry County by reducing congestion and improving mobility along existing US 17 and other roadways within this portion of the study area.

The proposed project could similarly benefit existing Brunswick Transit System (BTS) on-demand transportation services by reducing congestion and improving mobility along existing US 17 and other roadways within the Brunswick County portion of the study area.

The proposed project is expected to have a neutral impact or slight benefit for existing transit services in the project study area because it would improve connectivity and provide an alternative to congested roadways, thereby likely decreasing on-demand response times. The proposed project is expected to have minimal impacts on transit activity within the project study area during construction, although temporary impacts associated with construction may result in slight delays in response times for BTS users.

The study area is not currently served by passenger rail service.

4.2.2.3 Compatibility with Bicycle/Pedestrian Plans

None of the seven Detailed Study Alternatives for the proposed Carolina Bays Parkway Extension conflict with bicycle or pedestrian plans; however, all proposed alternatives cross portions of South Carolina bicycle routes, as well as portions of the proposed Brunswick County trail system. In addition, the proposed Calabash Road interchange for Alternative 7 would remove portions of the existing sidewalk network along Springmill Plantation Boulevard NW and Meadowlands Trail. Existing pedestrian and bicycling facilities may also be temporarily impacted during project construction.

The proposed Carolina Bays Parkway Extension would be a full control of access facility and will therefore not include bicycle or pedestrian facilities along the mainline. However, for all of the Detailed Study Alternatives, both Construction Phase 1 scenarios would provide widened eight-foot shoulders (two-foot paved) along sections of existing roadways (e.g., S-111, Mineola Avenue, Ash Little River Road, Calabash Road, and Hickman Road) in both Horry and Brunswick Counties. While these widened shoulders are not intended as dedicated bicycle accommodations, they would work to improve safety for cyclists along these routes. As outlined below in Table 4-3, there are several routes with recommended bicycle or pedestrian accommodations from local plans that intersect the seven Detailed Study Alternatives. The inclusion of multimodal accommodations along interchange routes, grade separations, and service roads will be further evaluated as more detailed roadway designs are developed for the Applicant's Preferred/LEDPA corridor.

4.2.3 Reasonably Foreseeable Land Use Effects

The potential for reasonably foreseeable land use effects associated with the proposed Carolina Bays Parkway Extension were qualitatively screened and documented in the *Indirect & Cumulative Effects Report* (NV5, December 2023), as well as the *Community Characteristics Report Addendum* (NV5, June 2021) and the *Community Indirect & Cumulative Effects No-Build Land Use Assessment* (STV, December 2023), each of which is appended by reference. FHWA, NCDOT, and SCDOT recognize that cumulative effects were defined in the CEQ regulations. However, the CEQ regulations are being rescinded. Thus, these reports should be viewed in the context of the definition of effects provided in the February 19, 2025 *Memorandum for Heads of Federal Departments and Agencies* with the subject: *Implementation of the National Environmental Policy Act*. The subject memorandum defines effects as reasonably foreseeable effects of the proposed action consistent with Section 102 of NEPA, which does not employ the term "cumulative effects;" NEPA instead requires consideration of "reasonably foreseeable" effects, regardless of whether or not those effects might be characterized as "cumulative."

Table 4-3. Routes Along Project Corridor with Recommended Bicycle and Pedestrian Accommodations from Local Plans for Detailed Study Alternatives

Route	Recommended Bicycle and Pedestrian Accommodations from Local Plans	Carolina Bays Parkway Extension Design Involvement	Intersecting Detailed Study Alternatives
Horry County			
SC 9	Access management improvements from SC-57 to US 17 interchange; incorporate bicycle and pedestrian facilities and median beautification	Interchange route	All Detailed Study Alternatives
Brunswick County			
Country Club Road	From US 17 to study area boundary; future trail[1], paved shoulder[2]	Interchange route	8
Calabash Road	From US 17 to Hickman Road; future trail[1], paved shoulder[2]	Interchange/ intersecting route	7, 8
Ash Little River Road	From Hickman Road to study area boundary; future trail[1], paved shoulder[2]	Interchange/ intersecting route	1, 1A, 2, 4, 4A
NC 904	From Russtown Road to study area boundary; future trail[1], side path[2]	Interchange route	All Detailed Study Alternatives
Russtown Road	From NC 904 to study area boundary; future trail[1], paved shoulder[2]	Realigned Russtown Road	1A, 4A
McMilly Road	From Old Shallotte Road to study area boundary; future trail[1], paved shoulder[2]	Grade separation	1A, 4A
Old Shallotte Road/ US 17 Business (N. Main Street)	Within study area; future trail[1] From US 17 to study area boundary; paved shoulder[3]	Interchange route	1, 2, 4, 7, 8
NC 130	From study area boundary to Bridgers Road; side path[2,3], greenway[4]	Interchange route	All Detailed Study Alternatives

[1]*Brunswick County Trail Plan*
[2]*Cape Fear Regional Bicycle Plan*
[3]*Draft Brunswick County Comprehensive Transportation Plan*
[4]*Brunswick County Greenway/Blueway Master Plan* (Draft Map)

The potential for reasonably foreseeable land use effects were assessed within the Future Land Use Study Area (FLUSA) for each of the seven Detailed Study Alternatives for the proposed Carolina Bays Parkway Extension project, as well as the No-Build Alternative. The FLUSA is the area surrounding a project that could be affected by the actions of others as a result of project completion in combination with the completion of other reasonably foreseeable projects in the area.

The proposed Carolina Bays Parkway Extension is included in and is compatible with local land use and transportation plans as noted in Sections 4.2.1 and 4.2.2.

4.2.3.1 Land Use Effects Analysis

The land use effects screening analysis conducted at this point in the project development process involved a series of contextual criteria that have been shown to inform the likelihood of land use changes independent of, and in conjunction with, transportation projects in numerous areas in both North Carolina and South Carolina, as well as nationally. These criteria include: scope of project (i.e., new versus existing location); travel time savings; forecasted population growth; forecasted employment growth; available land; water and wastewater availability; market for development; public

policy; and natural environment features. Each criterion is assessed individually relative to existing characteristics within the FLUSA for each of the seven Detailed Study Alternatives and the No-Build Alternative, and a relative rating is assigned on the scale of concern for potential effects resulting from anticipated land use changes, ranging from low concern to high concern. When multiple criteria are assigned moderate-high levels of concern for a project, further examination of potential land use effects may be warranted.

Below is a summary of each criteria and the relative rating of potential land use effects for the Detailed Study Alternatives and the No-Build Alternative in the South Carolina and North Carolina portions of the FLUSA.

Scope of Project

The scopes of the Detailed Study Alternatives in South Carolina and North Carolina are all representative of a linear project on new location for a distance of at least five miles based on the preliminary designs. All of the Detailed Study Alternatives would increase accessibility, as well as accommodate the creation of activity centers and future development. Based on these project scope characteristics, the screening stage level of concern relative to ICE potential for all alternatives in South Carolina is high. In North Carolina, the screening stage level of concern relative to potential land use effects is high for Alternatives 1, 1A, 4, and 4A; medium-high for Alternatives 2 and 7; and medium for Alternative 8.

Travel Time Savings

Potential travel time savings as a result of the project is anticipated to be high across all of the Detailed Study Alternatives. A time savings of 8 to 22 per minutes per vehicle is expected. The screening stage level of concern relative to potential land use effects is therefore high for all of the Detailed Study Alternatives.

Forecasted Population Growth

The population of the area is projected to grow at a faster rate than both North Carolina and South Carolina. Brunswick County is expected to grow at a rate of 2 percent compared to North Carolina's rate of 1.05 percent, and Horry County is expected to grow at a rate of 3.32 percent compared to South Carolina's rate of 1.19 percent. Based on the projected population growth, the screening stage level of concern relative to potential land use effects is medium-high in North Carolina and high in South Carolina for the No-Build Alternative. The screening stage level of concern relative to potential land use effects is high for all of the Detailed Study Alternatives in South Carolina and medium-high for all alternatives in North Carolina.

Forecasted Employment Growth

The current projection for employment growth (across all industries) in the Wilmington, NC Region (1.5 percent annually) is somewhat higher than the corresponding projection for statewide growth in North Carolina (0.9 percent annually), and relatively consistent with projected employment growth in the Waccamaw, SC Region (1.4 percent annually), which is slightly higher than the corresponding projection for statewide growth in South Carolina (1.1 percent annually). Based on the employment growth projections, the screening stage level of concern relative to potential land use effects is medium for employment growth for all of the Detailed Study Alternatives and the No-Build Alternative.

Available Land

The current stock of land considered to be available for development and redevelopment activity in the area is high with availability of land across the area ranging from 67.5 percent to 80 percent unweighted and greater than 93 percent weighted (by ease of assembly). Based on available land, the screening stage level of concern relative to potential land use effects is high for all of the Detailed Study Alternatives and the No-Build Alternative.

Water and Wastewater Service Availability

Municipal water service is available in all areas encompassed by the FLUSA and municipal wastewater service is currently available in 65 percent or more of the encompassed area, when local policies governing the accessibility of services are considered. Based on the availability/accessibility of municipal water and wastewater services in the majority of FLUSA areas, the screening stage level of concern relative to potential land use effects is high for all of the Detailed Study Alternatives in South Carolina, including the No-Build Alternative, and medium-high for all alternatives in North Carolina, including the No-Build Alternative.

Market for Development

Development activity is abundant in areas encompassed by the South Carolina portion of the FLUSA, generally occurring at a much faster pace and higher density than in Brunswick County. The area has experienced considerable development and redevelopment in recent years, including numerous projects that are currently ongoing or proposed for completion in the near-term future. While residential development remains the foothold in areas of the South Carolina portion of the FLUSA, with a notable volume of new residential units under construction or proposed, the overall pattern of development is becoming increasingly diversified in scale, mix, and intensity. The market for development is very strong in Horry County and construction of the proposed Carolina Bays Parkway Extension is anticipated to result in the development of moderate-to-high density activity centers at any new transportation/land use nodes that are created. The screening stage level of concern relative to potential land use effects is high for all of the Detailed Study Alternatives in South Carolina as well as the No-Build Alternative.

Recent trends in development activity across areas encompassed by the portion of the FLUSA that could be affected by the Detailed Study Alternatives in North Carolina are relatively moderate overall. The overwhelming majority of all development activity occurring in southwestern Brunswick County is single-family residential, primarily infill and expansion of existing subdivisions. There is also some recent multifamily residential development, as well as a small amount of commercial retail development. Development activity in the Brunswick County FLUSA has been well-distributed across local jurisdictions with some development occurring in all of them. The overall market in southwestern Brunswick County is largely consistent with other urban fringe locations around the state of North Carolina that have and continue to experience similar rates of growth. The screening stage level of concern relative to potential land use effects is medium for all of the Detailed Study Alternatives in North Carolina as well as the No-Build Alternative.

Public Policy

Standard long-range planning and corresponding zoning/development regulations to govern current development activities are in place throughout the various jurisdictions and while many have recently been updated to reflect current priorities, some are dated. As documented in the screening level ICE

documents, special rules for coastal areas apply to Brunswick, including North Carolina Coastal Stormwater Rules and North Carolina CAMA jurisdiction over coastal critical areas. In Horry County, the SCDHEC Office of Ocean and Coastal Resource Management (OCRM) has permit requirements in areas of Geographic Areas of Particular Concern (GAPC) in order to protect unique natural resources in areas, and areas where activities, development, or facilities depend on proximity to coastal waters in terms of use or access.

The screening stage level of overall concern relative to potential land use effects is medium-high for all of the Detailed Study Alternatives and the No-Build Alternative, based on the prevalence of reactionary local land use policies and the ability of local policies to ensure transparency and consistency in decisions affecting land use and development in jurisdictions in some areas.

Notable Environmental Features

Notable environmental features within the FLUSA in South Carolina include multiple impaired waterbodies, the coastal critical zone between US 17 and the ICW, and numerous classified streams. In North Carolina notable environmental features include multiple impaired waterbodies, estuarine shoreline AEC in Shallotte, floodplains, numerous classified streams that include High Quality Waters, multiple contiguous habitat areas with ratings of 2 through 7 out of ten in the NC Natural Heritage Program Biodiversity and Wildlife Habitat Assessment (Conservation Planning Tool), and multiple large habitat areas with ratings of six, seven, and eight, including extensive linear habitat along the Shallotte River corridor. Local planners indicated that medium to high levels of growth are occurring within the Carolina Bays Parkway Extension project area, which is expected to continue with or without the project into the near future. The screening stage level of concern relative to potential land use effects is medium-high to high for all of the Detailed Study Alternatives and the No-Build Alternative.

4.2.3.2 Land Use Effects Summary

Based on the information gathered and criteria evaluated, the screening stage level of concern for potential land use effects is generally medium to high for all of the Detailed Study Alternatives and the No-Build Alternative, as indicated above. Combined with the availability of developable land, this is indicative of a healthy economy in the area and the likelihood that growth and development will continue with the same rate and intensity within the FLUSA into the near future with or without the proposed Carolina Bays Parkway Extension.

As discussed in Sections 4.2.1 and 4.2.2, the proposed Carolina Bays Parkway Extension is included in, and each of the seven Detailed Study Alternatives are compatible with, the following local land use and highway plans: Horry County *Imagine 2040 Comprehensive Plan* (December 2019); *Brunswick County CAMA Core Land Use Plan* (2007); *Carolina Shores CAMA Comprehensive Plan* (2018); *Town of Shallotte, NC: 2018 Land Use Plan*; GSATS MPO *2040 Metropolitan Transportation Plan Update* (2017); and *Draft Brunswick County CTP* (September 2022). A review of these plans indicates the communities discussed in this DEIS as having the most growth and development (Horry County and Brunswick County) have the necessary land use controls in place to be able to guide and direct development. The *Community Indirect & Cumulative Effects No-Build Land Use Assessment* (STV, December 2023) provides a detailed land use controls analysis for the proposed project based on the local land use and highway plans listed above, as well as the land development regulations and guidelines contained in the Horry County Code of Ordinances and the Brunswick County Unified Development Ordinance. As discussed previously, FHWA, NCDOT, and SCDOT recognize that cumulative effects were defined in the CEQ regulations. However, the CEQ regulations are being rescinded. Thus, this report should be viewed in the context of the definition

of effects provided in the February 19, 2025 *Memorandum for Heads of Federal Departments and Agencies* with the subject: *Implementation of the National Environmental Policy Act*.

Brunswick County must also comply with NC Coastal Stormwater Rules and NC CAMA jurisdiction over coastal critical areas, and Horry County is subject to SCDHEC-OCRM regulations in coastal areas. Federal, state, and local regulations provide protections from development to both the human and natural environments within the FLUSA. Land use impacts to these resources should be limited by the regulations in place.

As documented in this section, land use changes in the FLUSA are anticipated to be similar whether the proposed Carolina Bays Parkway Extension is constructed or not. Therefore, potential effects resulting from land use changes are not a differentiating factor between the Detailed Study Alternatives. In addition, the potential difference in land use changes between the No-Build Alternative and the eventual Preferred Alternative/LEDPA is anticipated to be reasonably small. For these reasons, the screening level of land use effects analysis conducted to this point is appropriate for the DEIS. Once a Preferred Alternative/LEDPA is selected, additional effects analysis will be conducted in order to assess the Preferred Alternative/LEDPA's potential to influence land use changes compared to the No-Build Alternative, and the results will be documented in the FEIS.

4.2.4 Reasonably Foreseeable Resource Effects Due to Project and Actions By Others

This section evaluates the magnitude of potential impacts with all seven of the Detailed Study Alternatives for the proposed Carolina Bays Parkway Extension, when considered with other past, present, and reasonably foreseeable future actions, both public and private. A summary of actions that have been considered in this assessment is provided.

4.2.4.1 Past Actions

A summary of past actions by both public and private entities which have influenced growth and development patterns in the FLUSA and surrounding areas is provided in Table 4-4. The influence of existing Carolina Bays Parkway (SC 31) on growth patterns in Horry County is well-documented in long-range planning documents, so the baseline for past actions considered in this study is when initial planning for the Carolina Bays Parkway corridor began, generally the mid-eighties. The timeline for past actions that have been considered extends through 2016 when preliminary engineering and environmental studies were initiated jointly by NCDOT and SCDOT for the Carolina Bays Parkway Extension project. Note that the inventory of past actions is not intended to be comprehensive of all actions that are notable within the context of potential effects, rather it is a representative list of known actions.

Table 4-4. Summary of Past Actions Considered

Year	Past Actions
Public and Quasi-Public Actions	
1989	**The first conceptual alignment of Carolina Bays Parkway in Horry County is defined** in the North-South Corridor, Horry County, South Carolina – Conceptual Route Plan (1989), prepared by Waccamaw Regional Planning and Development Council in conjunction with the Grand Strand Regional Tourism Project. The Carolina Bays Parkway corridor extends from SC 544 to SC 9 on the west side of the Intracoastal Waterway (ICW).
1991	**Extension of Carolina Bays Parkway to the North Carolina State Line initially proposed** in the Carolina Bays Task Force Conceptual Criteria Report (1991), with recommendation to complete a feasibility study. The Task Force is largely comprised of local stakeholders and was established following completion of the Conceptual Route Plan in 1989. **Funding for the initial Carolina Bays Parkway feasibility study is allocated** in the US Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991.
1993	• **The first Carolina Bays Parkway Feasibility Study is completed in South Carolina**. It defined the project limits to include the GSATS planning boundary, which extended to the state line at the time. • **South Carolina Local Development Agreement Act** is adopted.
1996	**Horry County Road Improvement and Development Effort (RIDE) I Committee was formed**, comprised of various local stakeholders appointed by the county council, to advise on short- and long-term transportation infrastructure needs in the county as well as funding options. **The RIDE I program was established** with a priority focus on tourism. RIDE I projects included 20 roadway projects to improve the arterial network, including two projects located in the South Carolina FLUSA – the northern section of Carolina Bays Parkway and Robert Edge Parkway, a new connection across the ICW linking Main Street in North Myrtle Beach to the future Carolina Bays Parkway.
1997	• Horry County **RIDE I Program funding was established** through voter approval of a local hospitality tax. • **NCDOT completes the R-3436 Feasibility Study**, identifying four feasible alignments for the future I-74 corridor in Columbus and Brunswick Counties.
1998	• **Final EIS for Phase I of Carolina Bays Parkway** (US 17 to SC 9 in Horry County) signed. • Waccamaw River and ICW Watersheds in the South Carolina portion of the FLUSA are included in the 1998 South Carolina 303(d) List of Impaired Waters for Dissolved Oxygen (DO) levels and required to develop a Total Maximum Daily Load (TMDL) for point sources, including one in the FLUSA. The TMDL is approved in 1999. • Water Quality Monitoring Stations in the Little River Neck/Hog Inlet/Dunn's Sound watershed area are included in the 1998 South Carolina 303(d) List for Fecal Coliform for the first time. Multiple monitoring stations remain on the impaired list each cycle through 2016 (the most current available South Carolina list). A Section 319 Watershed Plan for Non-Point Sources (runoff) is later developed in 2018. The current target date for developing a TMDL is 2022.
2001	• Carolina Bays Parkway Extension Feasibility Study was initiated by SCDOT to evaluate the extension of the corridor from SC 9 to the state line. • Horry County RIDE II Program Committee formed. The primary focus of RIDE II was improvement of the local street network, including paving numerous dirt roads and rehab of existing local facilities.
2002	**Section 1 of Carolina Bays Parkway Phase I opens** to traffic in Horry County, from SC 9 to US 501 (22 miles).

Table 4-4. Summary of Past Actions Considered (continued)

Year	Past Actions
2004	• North Carolina Board of Transportation adopts I-74 as a Strategic Highway Corridor. • NCDOT and SCDOT enter into a joint agreement to expand limits of the ongoing Carolina Bays Parkway Extension Feasibility Study (initiated in 2001 by SCDOT) into Brunswick County.
2005	• **Section 2 of Carolina Bays Parkway Phase I opens** to traffic in Horry County, from US 501 to SC 544 (4.5 miles). • **NCDOT R-3436 Feasibility Study (1997) was updated** to include a statement that new alternative corridors were under consideration in the Carolina Bays Parkway Extension area of Brunswick County.
2006	• **Carolina Bays Parkway Extension Project Feasibility Study Report is completed**. The joint NCDOT-SCDOT study recommended a new location alignment extending from SC 9 in Horry County along the south side of S-57 to the state line, and along the north side of Hickman Road and US 17 in Brunswick County to a point just west of NC 904 (Feasibility Study Alternative B). • **Horry County RIDE II program funding was established** through voter approval of local one-cent Capital Projects Sales Tax.
2009	**Robert Edge Parkway opens to traffic in Horry County**, providing a new connection across the ICW, linking Carolina Bays Parkway to US 17 and Main Street in North Myrtle Beach.
2011	**The "Sandridge Tract" is annexed by the City of North Myrtle Beach.** The tract includes the area surrounding the SC 31 interchange with Robert Edge Parkway and extending east to the ICW.
2013	**North Myrtle Beach Sports and Park Complex development** initiated in Sandridge Tract
2015	• **Shallotte Riverfront Town Center Project master plan** is developed with assistance from UNC School of Government Development Finance Initiative, following the town's acquisition of properties in the plan area. • **Old Georgetown Road Extension opens to traffic** in Brunswick County.
2016	• **Proposed Carolina Bays Parkway Extension Project Development Study** and Federal EIS work initiated. • **Horry County RIDE III program funding established** through voter approval of local one-cent sales tax.
Private Actions and Trends	
1984 to 1988	**Major golf/residential communities begin developing in South Carolina and North Carolina**, including Colonial Charters, Heather Lakes and River Hills in South Carolina; Sea Trail and Brierwood in North Carolina. Note most of these communities are currently experiencing some form of redevelopment or expansion, including conversion of golf courses into residential at Heather Lakes (South Carolina) and Brierwood (Shallotte).
1989 to 1991	**Major golf/residential communities begin developing in North Carolina**, including Brunswick Plantation, Meadowlands, and Ocean Ridge Plantation. Residential phases of single- and multi-family continue to develop today in both Brunswick Plantation and Ocean Ridge Plantation.
1997 to 1999	**Golf course development in South Carolina and North Carolina**, which is not directly associated with major residential communities, including Glen Dornoch Golf Links in South Carolina, Marsh Harbour Golf Resort along the state line in Little River, and Calabash Lakes Golf Course in North Carolina. Glen Dornoch is the only course still in operation today. Marsh Harbour has since been vacated (timeline unclear) and Calabash Lakes Golf Course began converting into a single-family residential community around 2007.

Table 4-4. Summary of Past Actions Considered (continued)

Year	Past Actions
2001 to 2002	• **In North Carolina, minor golf/residential communities began developing.** Construction of the Farmstead, Crow Creek, and Thistle Downs golf courses began around 1999 to 2000, all of which are still active today. Residential sections of each were slow to develop with very few residences today in both Farmstead and Thistle Downs. Several residential sections of Crow Creek have been built to date, including multifamily, with development of single-family sections still ongoing. • **In South Carolina, small-scale resort residential development in Little River** along US 17 and the waterfront.
2003 to 2007	• In South Carolina, moderate scale single-family residential subdivisions begin developing along S-57. • In North Carolina, the Carolina Shores jurisdictional area is a focal point for development activity, including small and moderate scale residential subdivisions, as well as small scale industrial and commercial. • In North Carolina, notable expansion of Ocean Ridge Plantation.
2008 to 2013	• Private development activity slows notably in South Carolina and North Carolina during the recession and remains stagnant for several years. • **In 2011 McLeod Seacoast Medical Center opens** on SC 9 in Horry County.
2014 to 2016	• Approximately 680 acres in the Sandridge Tract near southern end of FLUSA in Horry County are placed in North American Land Trust (NALT) conservation easements. • **In 2014 new preliminary flood maps are released for Brunswick County**, an update to 2006 effective maps that would be adopted later in 2019. Zone AE Flood Hazard Areas are expanded along Thomasboro Road and US 17 (Carolina Shores and Brunswick County jurisdictions), affecting recently developed residential subdivisions. • **In 2016 McLeod Seacoast Medical Center expansion** in Horry County with opening of the new Emergency Department.

4.2.4.2 Current and Future Actions

A summary of current and future actions considered in this study is provided in Table 4-5. The timeline for current actions extends from 2017, the year following initiation of preliminary engineering and environmental studies for the Carolina Bays Parkway Extension project, through the time horizon of 2040. Note that the inventory of current and future actions is not intended to be comprehensive of all actions that are notable within the context of potential effects, rather it is a representative list of known actions.

Table 4-5. Summary of Current and Future Actions Considered

Year	Current and Future Actions
Public and Quasi-Public Actions	
2017	**Adoption of GSATS 2040 Metropolitan Transportation Plan (MTP)**, the current MTP for the MPO and the first to incorporate participation by North Carolina committee members since the expansion of GSATS boundary into Brunswick County.
2019	**Section 3 of Carolina Bays Parkway Phase I opens to traffic** in Horry County, from SC 544 to SC 707 (4 miles)
Future	• SCDOT and NCDOT STIP Transportation Projects: – SCDOT STIP intersection improvements project P038944 at S-57/S-111 (construction completed in late 2022). – NCDOT STIP projects on US 17: U-6104, U-5862, and R-5851. – NCDOT STIP projects on US 17 Business: R-5857 and U-5877. • Quasi-Public Transportation Project: New roadway connection (Champions Boulevard/SC 90) between Robert Edge Parkway, Long Bay Road, and Water Tower Road in association with Sandridge Tract Development Agreement. • Brunswick County Northwest Water Treatment Plant expansion.
Private Actions and Trends	
2017	**Bridgewater and Heather Glen golf course conversions** into residential/Planned Development District initiated.
2018	**McLeod Seacoast Medical Center expansion** in Horry County with opening of a new inpatient tower, which doubles the total inpatient capacity from 50 to 105 beds.
2020 and Future	Continued private development activity throughout FLUSA jurisdictions[1].

[1]*Indirect & Cumulative Effects Report* (NV5, December 2023), Table 4-1.

4.2.4.3 Reasonably Foreseeable Resource Effects Due to Project and Actions By Others Summary

All seven of the Detailed Study Alternatives for the proposed Carolina Bays Parkway Extension project are expected to contribute to effects on resources, along with other independent future changes within the FLUSA. Table 4-6 provides a summary of impaired and/or protected notable environmental features located within the FLUSA and highlights reasonably foreseeable effects.

4.3 Impacts to the Physical Environment for Detailed Study Alternatives

4.3.1 Noise Impacts

In accordance with 23 CFR 772 (*Procedures for Abatement of Highway Traffic Noise and Construction Noise*) and the NCDOT Traffic Noise Policy, each Type I highway project must be analyzed for predicted traffic noise impacts. In general, Type I projects are proposed State or Federal highway projects that construct a highway on new location, add new through lanes to an existing highway, substantially change the horizontal or vertical alignment of an existing highway, add or relocate interchange ramps or loops to complete an existing partial interchange, or involve new construction or substantial alteration of transportation facilities such as weigh stations, rest stops, ride-share lots or toll plazas.

Table 4-6. Summary of Reasonably Foreseeable Effects in the FLUSA

Resource	Description	Reasonably Foreseeable Effects
100-year Floodplain	The FLUSA contains extensive areas of 100-year floodplain, particularly the Brunswick County portion, including existing crossings of the floodplain by US 17.	Pressure for development and redevelopment in 100-year floodplain areas where encroachments are permitted, resulting in a higher aggregate density of built/impervious area in the 100-year floodplain.
Coastal Critical Area (South Carolina)	The South Carolina Coastal Critical Area extends east of US 17 through the Horry County portion of the FLUSA.	Pressure for development and redevelopment in the Little River Waterfront area, leading to a higher aggregate density of built/impervious area within the South Carolina Coastal Critical Area.
Estuarine Shoreline AEC (North Carolina CAMA)	The estuarine shoreline AEC extends along the Shallotte River shoreline in the core incorporated area of Shallotte within the FLUSA, including two existing crossings at US 17 Business (Main Street) and NC 130 (Whiteville Road).	Development pressure in targeted growth areas of Shallotte, including the Shallotte Riverfront Town Center project area, Main Street corridor, and intended mixed-use districts in the Town core, will lead to a higher aggregate density of built/impervious surface in areas adjacent to the Shallotte River estuarine shoreline.
Section 303(d) Impairments	There are currently two approved TMDL plans for watersheds, one historically impaired watershed with future TMDL pending, and two individual waterbodies on the 303(d) list.	The higher aggregate density of impervious surface throughout the FLUSA, as a result of development, will lead to increased surface water runoff and could further degrade impaired waters and watersheds.
North Carolina NHP Natural Areas (NHPNAs)	Multiple NHPNAs are located in the Brunswick County portion of the FLUSA, wherein one or more high-quality or rare natural communities, rare species, and/or special animal habitats are located.	Development pressure for active uses in and around NHPNAs could lead to higher intensity of land uses in areas adjacent to NHPNAs and/or fragmentation of existing habitat, potentially impacting the integrity of NHPNAs.
VAD Properties	Farm properties enrolled in the Brunswick County VAD program are subject to terms of a preservation agreement that offers protection from non-farm development. VAD properties are located throughout the FLUSA in Brunswick County.	New location alignments which bisect VAD properties will lead to fragmentation of farm units, potentially impacting eligibility for continued enrollment in the program, and an aggregate loss of productive farmland area.
Streams and Wetlands	Numerous streams, as well as coastal and non-coastal wetland areas, are located throughout the FLUSA, including regulatory streams and wetlands that are protected under Section 404 of the Clean Water Act and non-regulatory streams and wetlands.	Development pressure throughout the FLUSA will lead to encroachment in non-regulatory streams and wetlands, resulting in aggregate loss of total stream and wetland area.

Traffic noise impacts are determined through implementing the current Traffic Noise Model (TNM®) approved by the FHWA and following procedures detailed in 23 CFR 772, the NCDOT Traffic Noise Policy

and the NCDOT Traffic Noise Manual, and the SCDOT Traffic Noise Abatement Policy. When traffic noise impacts are predicted, examination and evaluation of alternative noise abatement measures must be considered for reducing or eliminating these impacts. Construction noise impacts may occur if noise-sensitive receptors are in proximity to project construction activities. All reasonable efforts should be made to minimize exposure of noise sensitive areas to construction noise impacts.

The source of this traffic noise information is *Traffic Noise Report, Carolina Bays Parkway (STIP Project R-5876)* (Gannett Fleming, September 2023). NCDOT's Traffic Noise Policy and SCDOT's Traffic Noise Abatement Policy are both included in the appendices of the Traffic Noise Report**.**

4.3.1.1 Traffic Noise Impacts and Noise Contours

The maximum number of receptors for each of the seven Detailed Study Alternatives predicted to become impacted by future traffic noise is shown in Table 4-7. The table includes those receptors expected to experience traffic noise impacts by either approaching or exceeding the FHWA Noise Abatement Criteria (NAC), or by a substantial increase in exterior noise levels as defined in the NCDOT Traffic Noise Policy and SCDOT Traffic Noise Abatement Policy. Note that the vehicle speed used for the traffic noise impact analysis was the posted speed limit plus five miles per hour (mph) for the 2019 Existing and 2045 Future Year No-Build scenarios, and the proposed 70 mph posted speed limit plus five mph (i.e., 75 mph) for the Detailed Study Alternatives.

Table 4-7. Predicted Traffic Noise Impacts for Detailed Study Alternatives

Traffic Noise Impacts[1]	Detailed Study Alternatives													
	1		1A		2		4		4A		7		8	
	Total		Total		Total		Total		Total		Total		Total	
	SC	NC	SC	NC	SC	NC	SC	NC	SC	NC	SC	NC	SC	NC
Residential (NAC B)	66		73		164		35		39		168		120	
	35	31	38	35	35	129	4	31	4	35	4	164	17	103
Places of Worship, Schools, Parks, etc. (NAC C & D)	5		1		11		5		1		11		6	
	0	5	0	1	0	11	0	5	0	1	0	11	0	6
Businesses (NAC E)	0		0		0		0		0		0		0	
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	71		74		175		40		40		179		126	
	35	36	38	36	35	140	4	36	4	36	4	175	17	109

[1]Per TNM 2.5 and in accordance with 23 CFR 772.

The maximum extent of the 71- and 66-dBA noise level contours measured from the edge of the nearest travel lane for each of the seven Detailed Study Alternatives is shown in Table 4-8. In accordance with 23 CFR 772.17, NCDOT and SCDOT must inform local officials of the predicted traffic noise contours for land use planning purposes.

Table 4-8. Traffic Noise Contours for Detailed Study Alternatives

Detailed Study Alternative	Location	71 dBA (feet from edge of nearest travel lane)	66 dBA (feet from edge of nearest travel lane)
Alternative 1	East of US 17 between US 17 Business and NC 130 (Whiteville Road)	155	245
	West of Carolina Bays Parkway Ext. between US 17 and Pea Landing Rd	135	225
	North of Carolina Bays Parkway Extension between Ash Little River Road and Pea Landing Road	125	220
	North of Carolina Bays Parkway Extension between Little River Road and Ash Little River Road	150	240
	South of US 17 between Ocean Isle Beach Road and Washington Road	165	265
	North of US 17 between NC 904 (Longwood Road) and Ocean Isle Beach Rd	140	240
	South of Carolina Bays Parkway Extension between SC 9 and Little River Rd	145	235
Alternative 1A	North of Carolina Bays Parkway Extension between NC 904 (Longwood Road) and McMilly Road	145	235
	North of Carolina Bays Parkway Extension between Ash Little River Road and Pea Landing Road	140	235
	North of Carolina Bays Parkway Extension between Little River Road and Ash Little River Road	165	260
	South of Carolina Bays Parkway Extension between SC 9 and Little River Rd	75	145
Alternative 2	East of US 17 between US 17 Business and NC 130 (Whiteville Road)	100	175
	North of Carolina Bays Parkway Extension between Little River Road and Ash Little River Road	155	245
	South of US 17 between Ocean Isle Beach Road and Washington Road	155	245
	North of US 17 between NC 904 (Longwood Road) and Ocean Isle Beach Rd	145	245
	South of US 17 between Thomasboro Road and NC 904 (Seaside Road)	165	260
	North of Carolina Bays Parkway Extension between Ash Little River Road and US 17	145	235
	South of Carolina Bays Parkway Extension between SC 9 and Little River Rd	150	240
Alternative 4	East of US 17 between US 17 Business and NC 130 (Whiteville Road)	155	245
	West of Carolina Bays Parkway Ext. between US 17 and Pea Landing Rd	135	225
	North of Carolina Bays Parkway Extension between Ash Little River Road and Pea Landing Road	125	225
	North of Carolina Bays Parkway Extension between Little River Road and Ash Little River Road	150	240
	South of US 17 between Ocean Isle Beach Road and Washington Road	165	265
	North of US 17 between NC 904 (Longwood Road) and Ocean Isle Beach Rd	140	240
	North of Carolina Bays Parkway Extension between SC 9 and Little River Rd	155	250

Table 4-8. Traffic Noise Contours for Detailed Study Alternatives (continued)

Detailed Study Alternative	Location	71 dBA (feet from edge of nearest travel lane)	66 dBA (feet from edge of nearest travel lane)
Alternative 4A	North of Carolina Bays Parkway Extension between NC 904 (Longwood Road) and McMilly Road	145	235
	North of Carolina Bays Parkway Extension between Ash Little River Road and Pea Landing Road	140	235
	North of Carolina Bays Parkway Extension between Little River Road and Ash Little River Road	160	260
	North of Carolina Bays Parkway Extension between SC 9 and Little River Rd	165	265
Alternative 7	East of US 17 between US 17 Business and NC 130 (Whiteville Road)	165	265
	North of Carolina Bays Parkway Extension between Little River Road and Calabash Road	165	265
	South of US 17 between Ocean Isle Beach Road and Washington Road	175	280
	North of US 17 between NC 904 (Longwood Road) and Ocean Isle Beach Rd	155	260
	South of US 17 between Thomasboro Road and NC 904 (Seaside Road)	170	277
	South of Carolina Bays Parkway Ext. between Calabash Road and US 17	160	265
	North of Carolina Bays Parkway Extension between SC 9 and Little River Rd	170	270
Alternative 8	East of US 17 between US 17 Business and NC 130 (Whiteville Road)	165	262
	South of US 17 between Ocean Isle Beach Road and Washington Road	165	265
	North of US 17 between NC 904 (Longwood Road) and Ocean Isle Beach Rd	145	240
	South of US 17 between Thomasboro Road and NC 904 (Seaside Road)	165	260
	East of US 17 between Calabash Road and Thomasboro Road	155	245
	North of Carolina Bays Parkway Extension between Mineola Avenue and Calabash Road	150	245
	North of Carolina Bays Parkway Extension between Little River Road and Mineola Avenue	150	245
	North of Carolina Bays Parkway Extension between SC 9 and Little River Rd	155	250

4.3.1.2 Traffic Noise Abatement Measures

Measures for reducing or eliminating the traffic noise impacts were considered for all impacted receptors for each of the seven Detailed Study Alternatives. The primary noise abatement measures evaluated for highway projects include highway alignment changes, traffic system management measures, establishment of buffer zones, noise barriers, and noise insulation (NAC D only). For each of these measures, benefits versus allowable abatement quantity (reasonableness), engineering feasibility, effectiveness, and other factors were included in the noise abatement considerations.

Substantially changing the highway alignment to minimize noise impacts is not considered to be a viable option for this project due to engineering and/or environmental factors. Traffic system management measures are not considered viable for noise abatement due to the negative impact they would have on the capacity and level of service of the proposed roadway. Costs to acquire buffer zones for impacted receptors will exceed the NCDOT base dollar value of $22,500 per benefited receptor plus an incremental increase as defined in the NCDOT Traffic Noise Manual, causing this abatement measure to be unreasonable.

4.3.1.3 Noise Barriers

Noise barriers were assessed using the feasibility and reasonableness criteria found in the respective NCDOT and SCDOT traffic noise abatement policies, which are included in the appendices of the Traffic Noise Report. Noise barriers include two basic types: earthen berms and noise walls. These structures act to diffract, absorb, and reflect highway traffic noise. For this project, earthen berms are not found to be a viable abatement measure because the additional right-of-way, materials, and construction costs are estimated to exceed the NCDOT maximum allowable base quantity of 4,200 cubic yards per benefited receptor plus an incremental increase as defined in the NCDOT Traffic Noise Policy. (Note that SCDOT's noise abatement policy does not include feasibility and reasonableness criteria for earthen berms.) For the South Carolina portion of the project, noise barriers were assessed using a cost per benefited receptor of $30,000, per SCDOT's feasibility and reasonableness criteria.

A noise barrier evaluation was conducted for this project utilizing the Traffic Noise Model (TNM 2.5) software developed by the FHWA. Table F-1 in Appendix F summarizes the results of the evaluation for the seven Detailed Study Alternatives.

4.3.1.4 Traffic Noise Summary

A traffic noise evaluation was performed that identified the following noise barriers that preliminarily meet feasibility and reasonableness criteria found in the respective NCDOT and SCDOT traffic noise abatement policies for each of the seven Detailed Study Alternatives (also see Table F-1 in Appendix F):

- Alternative 1 (one noise barrier): Barrier NW2.
- Alternative 1A (three noise barriers): Barriers NW4, NW5, and NW 10.
- Alternative 2 (seven noise barriers): Barriers NW2, NW50, NW52, NW58, NW59, NW 61, and NW62.
- Alternative 4 (one noise barrier): Barrier NW2.
- Alternative 4A (three noise barriers): Barriers NW4, NW5, and NW10.
- Alternative 7 (seven noise barriers): Barriers NW2, NW50, NW52 (Part 1), NW68/70, NW72, NW73, and NW 77.
- Alternative 8 (six noise barriers): Barriers NW2, NW50, NW52, NW68/69, NW87, and NW97.

The Traffic Noise Report contains additional information on the noise barrier evaluation conducted for the Detailed Study Alternatives. A more detailed analysis will be completed during project final design. Noise barriers preliminarily found to be feasible and reasonable during the preliminary noise analysis may not be found to be feasible and reasonable during the final design noise analysis due to changes in proposed project alignment and other design considerations, surrounding land use development, or

utility conflicts, among other factors. Conversely, noise barriers that preliminarily were not considered feasible and reasonable may meet the established criteria and be recommended for construction.

In accordance with NCDOT Traffic Noise Policy and SCDOT Traffic Noise Abatement Policy, the Federal/State governments are not responsible for providing noise abatement measures for new development for which building permits are issued after the Date of Public Knowledge. The Date of Public Knowledge of the proposed highway project will be the approval date of the Record of Decision. NCDOT and SCDOT strongly advocate the planning, design, and construction of noise-compatible development and encourage its practice among planners, building officials, developers, and others.

4.3.2 Air Quality

The Federal Clean Air Act of 1970 established the National Ambient Air Quality Standards (NAAQS). These standards were established in order to protect the public health, safety, and welfare from known or anticipated effects of air pollutants. The NAAQS contain criteria for sulfur dioxide (SO2), particulate matter (PM10, 10-micron and smaller; PM2.5, 2.5- micron and smaller), carbon monoxide (CO), nitrogen dioxide (NO2), ozone (O3), and lead (Pb). Section 3.3.2 of this DEIS provides additional information on the primary pollutants emitted from motor vehicles and the current air quality conditions in the project study area.

In addition to the criteria air pollutants for which there are NAAQS, the US Environmental Protection Agency (USEPA) also regulates air toxics. USEPA identified nine compounds with significant contributions from mobile sources. In January 2023, FHWA issued its Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents (FHWA, January 18, 2023) to advise FHWA Division offices on when and how to analyze mobile source air toxics (MSAT) under the NEPA review process for highway projects. As a result, a project-level qualitative air quality analysis was prepared for the proposed project. The *Qualitative Air Quality Report, Carolina Bays Parkway Extension, from SC 9 to US 17 Shallotte Bypass* documents the project-level air quality analysis prepared for the proposed project.

4.3.2.1 Mobile Source Air Toxics

Background

Controlling air toxic emissions became a national priority with the passage of the Clean Air Act Amendments (CAAA) of 1990, whereby Congress mandated that the USEPA regulate 188 air toxics, also known as hazardous air pollutants. USEPA assessed this expansive list in its rule on the Control of Hazardous Air Pollutants from Mobile Sources (Federal Register, Vol. 72, No. 37, page 8430, February 26, 2007), and identified a group of 93 compounds emitted from mobile sources that are part of USEPA's Integrated Risk Information System (IRIS). In addition, USEPA identified nine compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers or contributors and non-cancer hazard contributors from the 2011 National Air Toxics Assessment (NATA). These are 1,3-butadiene, acetaldehyde, acrolein, benzene, diesel particulate matter (diesel PM), ethylbenzene, formaldehyde, naphthalene, and polycyclic organic matter. FHWA considers these the priority MSAT.

Motor Vehicle Emissions Simulator (MOVES)

Using USEPA's MOVES3 model, FHWA estimates that even if VMT increases by 31 percent from 2020 to 2060 as forecast, a combined reduction of 76 percent in the total annual emissions for the priority MSAT is projected for the same time period.

Consideration of MSAT in NEPA Documents

The FHWA developed a tiered approach with three categories for analyzing MSAT in NEPA documents, depending on specific project circumstances:

1. No analysis for projects with no potential for meaningful MSAT effects;
2. Qualitative analysis for projects with low potential MSAT effects; or
3. Quantitative analysis to differentiate alternatives for projects with higher potential MSAT effects.

For projects warranting MSAT analysis, all nine priority MSAT should be considered.

Each of the seven Detailed Study Alternatives for the proposed Carolina Bays Parkway Extension fall under Category 2. The project will not create a facility that is likely to meaningfully increase MSAT emissions. The 2045 design year traffic is not projected to meet or exceed the 140,000 to 150,000 AADT criterion, meaning a quantitative MSAT emissions analysis will not be conducted.

Qualitative MSAT Analysis

A qualitative emissions analysis provides a basis for identifying and comparing the potential differences among MSAT emissions, if any, between the seven Detailed Study Alternatives. The qualitative assessment presented below is derived in part from a study conducted by FHWA titled *A Methodology for Evaluating Mobile Source Air Toxic Emissions Among Transportation Project Alternatives* (www.fhwa.dot.gov/environment/air_quality/air_toxics/research_and_analysis/mobile_source_air_toxics/msatemissions.cfm).

For each Detailed Study Alternative, the amount of MSAT emitted would be proportional to the daily vehicle miles traveled, or VMT, assuming that other variables such as fleet mix are the same for each alternative. The daily VMT estimated for each of the Detailed Study Alternatives is higher than that for the No-Build Alternative due to the new location segments and overall regional connectivity enhancements being provided by the proposed project. Based on the traffic operations analyses conducted for the proposed project, the percent change in 2045 VMT daily for the Detailed Study Alternatives (estimated to range from 114,073 VMT daily for Alternative 7 to 116,531 VMT daily for Alternative 4) in comparison to the No-Build Alternative (estimated 91,789 VMT daily) ranges from 24 percent (with Alternatives 7 and 8) to 27 percent (with Alternatives 2 and 4).

This increase in VMT would lead to higher MSAT emissions for the Detailed Study Alternatives along each highway corridor, along with a corresponding decrease in MSAT emissions along the parallel routes. The emissions increase is offset somewhat by lower MSAT emission rates due to increased speeds; according to the USEPA's MOVES3 model, emissions of all of the priority MSAT decrease as speed increases. Because the estimated daily VMT under each of the Detailed Study Alternatives are nearly the same, varying by less than three percent, it is expected there would be no appreciable difference in overall MSAT emissions among the various alternatives. Also, regardless of the alternative chosen, emissions will likely be lower than present levels in the 2045 design year as a result of USEPA's national control programs that are projected to reduce annual MSAT emissions by over 76 percent between 2020 and 2060 (*Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents*, FHWA, January 18, 2023). Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures; however, the magnitude of the USEPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions within the study area are likely to be lower in the future in nearly all cases.

The travel lanes contemplated as part of the Detailed Study Alternatives will have the effect of moving some traffic closer to nearby homes, schools and businesses; therefore, under each alternative there may be localized areas where ambient concentrations of MSAT could be higher under certain Detailed Study Alternatives than the No-Build Alternative. The localized increases in MSAT concentrations would likely be most pronounced along the new/expanded roadway sections in North Carolina that would be built near existing development under Alternatives 2, 7, and 8; however, this is only for a short section of the corridor and as shown on Figure 12 the routes for the Detailed Study Alternatives align on the eastern side of the study area. Some points of interest include the Brunswick Plantation, Meadowlands, and Crow Creek subdivisions, as well as the Southwest Brunswick Branch Library. Within South Carolina the localized difference in MSAT concentration would be more pronounced along Alternative 8 as it is in proximity to Anchor Baptist Church, as well as Alternatives 1, 1A, and 2 related to the proximity to Colonial Charters and North Village subdivisions.

In summary, when a highway is added or widened, the localized level of MSAT emissions for the Build Alternative could be higher relative to the No-Build Alternative, but this could be offset due to increases in speeds and reductions in congestion (which are associated with lower MSAT emissions). Also, MSAT will be lower in other locations when traffic shifts away from them. However, USEPA's vehicle and fuel regulations, coupled with fleet turnover, will over time cause substantial reductions that, in almost all cases, will cause MSAT levels to be significantly lower than today.

Incomplete or Unavailable Information for Project Specific MSAT Health Impact Analysis

In FHWA's view, information is incomplete or unavailable to credibly predict the project-specific health impacts due to changes in MSAT emissions associated with a proposed set of highway alternatives. The outcome of such an assessment, adverse or not, would be influenced more by the uncertainty introduced into the process through assumption and speculation rather than any genuine insight into the actual health impacts directly attributable to MSAT exposure associated with a proposed action.

USEPA is responsible for protecting the public health and welfare from any known or anticipated effect of an air pollutant. They are the lead authority for administering the Clean Air Act and its amendments and have specific statutory obligations with respect to hazardous air pollutants and MSAT. USEPA is in the continual process of assessing human health effects, exposures, and risks posed by air pollutants. They maintain the Integrated Risk Information System (IRIS), which is "a compilation of electronic reports on specific substances found in the environment and their potential to cause human health effects" (USEPA, http://www.epa.gov/iris). Each report contains assessments of non-cancerous and cancerous effects for individual compounds and quantitative estimates of risk levels from lifetime oral and inhalation exposures with uncertainty spanning perhaps an order of magnitude.

Other organizations are also active in the research and analyses of the human health effects of MSAT, including the Health Effects Institute (HEI). A number of HEI studies are summarized in Appendix D of FHWA's *Updated Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA Documents*. Among the adverse health effects linked to MSAT compounds at high exposures are: cancer in humans in occupational settings; cancer in animals; and irritation to the respiratory tract, including the exacerbation of asthma. Less obvious is the adverse human health effects of MSAT compounds at current environmental concentrations or in the future as vehicle emissions substantially decrease.

The methodologies for forecasting health impacts include emissions modeling; dispersion modeling; exposure modeling; and then final determination of health impacts – each step in the process building on the model predictions obtained in the previous step. All are encumbered by technical shortcomings or uncertain science that prevents a more complete differentiation of the MSAT health impacts among a

set of project alternatives. These difficulties are magnified for lifetime (i.e., 70 year) assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over that time frame, since such information is unavailable.

It is particularly difficult to reliably forecast 70-year lifetime MSAT concentrations and exposure near roadways; to determine the portion of time that people are actually exposed at a specific location; and to establish the extent attributable to a proposed action, especially given that some of the information needed is unavailable.

There are considerable uncertainties associated with the existing estimates of toxicity of the various MSAT, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population, a concern expressed by HEI. As a result, there is no national consensus on air dose-response values assumed to protect the public health and welfare for MSAT compounds, and in particular for diesel PM. USEPA states that with respect to diesel engine exhaust, "[t]he absence of adequate data to develop a sufficiently confident dose-response relationship from the epidemiologic studies has prevented the estimation of inhalation carcinogenic risk" (USEPA, https://iris.epa.gov/static/pdfs/0642_summary.pdf).

There is also the lack of a national consensus on an acceptable level of risk. The current context is the process used by the USEPA as provided by the Clean Air Act to determine whether more stringent controls are required in order to provide an ample margin of safety to protect public health or to prevent an adverse environmental effect for industrial sources subject to the maximum achievable control technology standards, such as benzene emissions from refineries. The decision framework is a two-step process. The first step requires USEPA to determine an "acceptable" level of risk due to emissions from a source, which is generally no greater than approximately 100 in a million. Additional factors are considered in the second step, the goal of which is to maximize the number of people with risks less than 1 in a million due to emissions from a source. The results of this statutory two-step process do not guarantee that cancer risks from exposure to air toxics are less than 1 in a million; in some cases, the residual risk determination could result in maximum individual cancer risks that are as high as approximately 100 in a million. In a June 2008 decision, the U.S. Court of Appeals for the District of Columbia Circuit upheld USEPA's approach to addressing risk in its two step decision framework. Information is incomplete or unavailable to establish that even the largest of highway projects would result in levels of risk greater than deemed acceptable.

Because of the limitations in the methodologies for forecasting health impacts described, any predicted difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with predicting the impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information against project benefits, such as reducing traffic congestion, accident rates, and fatalities plus improved access for emergency response, that are better suited for quantitative analysis.

4.3.2.2 Summary

Vehicles are a major contributor to decreased air quality because they emit a variety of pollutants into the air. Changing traffic patterns are a primary concern when determining the impact of a new highway facility or the improvement of an existing highway facility. New highways or the widening of existing highways increase localized levels of vehicle emissions, but these increases could be offset due to increases in speeds from reductions in congestion and because vehicle emissions will decrease in areas where traffic shifts to the new roadway. Significant progress has been made in reducing criteria

pollutant emissions from motor vehicles and improving air quality, even as vehicle travel has increased rapidly.

The proposed project is located in Brunswick County, North Carolina and Horry County, South Carolina, both of which are in attainment with the NAAQS. Therefore, the seven Detailed Study Alternatives for the proposed Carolina Bays Parkway Extension are not expected to create any adverse effects on the air quality. This evaluation completes the assessment requirements for air quality of the 1990 Clean Air Act Amendments and the NEPA process, and no additional reports are necessary.

4.3.3 Extreme Events

Standard practice in both States typically applies (up to) the 50-year return period to capture hydrologic and hydrodynamic design risks on a project-by-project basis. Such practice does not consider risks from extreme events as permitted under statute (23 United States Code, Sections 109, 116, 118, 133, 134, 150, and 503). However, the nature of the Carolina Bays Parkway Extension project varies from such practice as it: (1) encompasses both NCDOT and SCDOT; (2) has the hydrologic and hydrodynamic risks from extreme events (including sea level elevation change and extreme weather events); and (3) those risks have equal applicability to both jurisdictions. To mitigate these project-associated extreme event risks, NCDOT proposed the project design to be at the 100-year design flood event. This approach conforms with NCDOT's Guidelines for Drainage Studies and Hydraulic Design where it would be considered "reasonable and prudent that higher hydraulic performance standards for the Strategic Transportation Corridor network, major arterials, evacuation routes, and other important roadways should be carefully considered during planning and design to include, among other things, risk to commerce, accessibility, and evacuation due to road closure caused by inundation, including non-stationarity in future extreme event models" (NCDOT, Guidelines for Drainage Studies and Hydraulic Design, Chapter 7). Designing the proposed project based on the 100-year storm event will enhance its resilience against extreme events, ensuring continued functionality during and after such events. This approach is also compliant with FHWA regulatory elements such as in the location hydraulic study under 23 CFR 650.111(c)(1) that requires a discussion, commensurate with the risks associated with implementation of an action included in environmental documentation. For this project, SCDOT has agreed to apply the same 100-year approach. To do so, during the design phase of this project effort (as per 23 CFR 625.3(f)) SCDOT will produce a design variance document that aligns with the NCDOT design guidance. Together, such design guidance and design variance aligns with FHWA design standards found under 23 CFR 650.115.

The potential impacts of sea level elevation change on roadway infrastructure may include, but are not limited to, impacts on coastal water quality, evacuation, natural systems, recreation, or roadway efficiencies including mobility, accessibility, and level of service. Mitigating these impacts may be accomplished through structured or soft buffers to hold back or reduce the pressure from the sea or the elevation of land surface or structures. In an effort to reduce the potential impact of flooding and storm surge on transportation infrastructure, the expected sea level elevation change can be a consideration used during the final design of the roads and structures. FHWA, NCDOT, and SCDOT acknowledge that there are risks and uncertainty in the future regarding sea level elevation change and storm events.

For the sea level elevation change analysis for the proposed Carolina Bays Parkway Extension, a Mississippi State University online tool, developed in collaboration with the National Oceanic and Atmospheric Administration (NOAA), that allows the user to download reports showing a range of sea level elevation change projection data for coastal regions around the United States was used to obtain data for the South Carolina and North Carolina coastlines near the study area. Data were obtained for

the two closest sites to the study area: Site 1444 (located at the Springmaid Pier in Myrtle Beach, SC) and Site 396 (located in the Cape Fear River west of downtown Wilmington, NC). The complete data reports for these sites are included in the *Preliminary Hydraulics Study for Environmental Impact* (NV5, April 2022), which is appended by reference.

A review of the sea level elevation change projection report at Site 1444 (closest to the study area) shows that there is a wide range of potential projected increases in mean sea level for Horry County in the year 2100, from a "low" of 1.2 feet to an "extreme" of 10.4 feet. For the purposes of the Carolina Bays Parkway Extension sea level elevation change analysis, the "intermediate-high" value of 5.8 feet was used.

The intermediate-high value corresponds to a 0.5 percent chance that sea level elevation change will be at least 5.8 feet at a Representative Concentration Pathway (RCP) value of 4.5. The three RCPs values identified in the online tool are 2.6, 4.5, and 8.5. The lower value assumes a very stringent pathway that shows declining carbon dioxide emissions that start in 2020 and go to zero by 2100. Whereas the highest value of 8.5 assumes emissions continue to rise through the year 2100. Based on the projections of carbon emissions from present day to 2100 as presented in these various RCPs, the intermediate-high value of 5.8 feet seems to be an appropriate, mid-range estimation of sea level elevation change by 2100 for Brunswick County and Horry County including the Carolina Bays Parkways Extension study area.

All of the Detailed Study Alternatives are largely located on a ridge between the Waccamaw River and the Atlantic Ocean to minimize stream, wetland, and floodplain impacts. As such, most of the lengths of the Detailed Study Alternatives will not be affected by tidal influences. The northern terminus of all of the Detailed Study Alternatives is in the same location on US 17 Bypass near the existing NC 130 interchange, which is the lowest elevation within the study area. This portion of US 17 Bypass does experience some tidal influence from the south along the Shallotte River and its tributaries, Lookout Branch and Mulberry Branch, both of which are crossed by all of the Detailed Study Alternatives on the same alignment. This is the area where all of the Detailed Study Alternatives would be most susceptible to potential sea level elevation change impacts since they would be at-risk for inundation.

All of the Detailed Study Alternatives using CP1 – S1 would use sections of existing S-111 and Mineola Avenue in Horry County to connect the new location portion of the proposed Carolina Bays Parkway Extension to US 17. Neither of these roads is susceptible to tidal influences, but each has experienced flooding on occasion during extreme weather events. No changes to current hydraulic structures are proposed.

All of the Detailed Study Alternatives using CP1 – S2 (with the exception of Alternative 8) would use sections of existing Ash Little River Road and Hickman Road in Brunswick County to connect the new location portion of the proposed facility to US 17. Neither of these roads is susceptible to tidal influences, however, backwater flooding from the Waccamaw River and its tributaries has occurred during previous storm events. Improvements to hydraulic structures consist of retaining and extending culverts rather than increasing the conveyance.

4.3.4 Farmland Impacts

All of the Detailed Study Alternatives will impact prime farmland. Prime farmland does not include land already in or committed to urban development or water storage. Prime farmland "already in" urban development includes all land that has been designated for commercial or industrial use, or residential use that is not intended at the same time to protect farmland in a:

1. Zoning code or ordinance adopted by the state or local unit of government; or
2. A comprehensive land use plan which has expressly been either adopted or reviewed in its entirety by the unit of local government in whose jurisdiction it is operative within ten years preceding the implementation of the project.

Farmland soils eligible for protection under the Farmland Protection Policy Act are present within the project footprint of the Detailed Study Alternatives. Table 4-9 shows the anticipated prime farmland impacts associated with each of the seven Detailed Study Alternatives. A preliminary screening of farmland conversion impacts within the study area will be completed using Natural Resources Conservation Service (NRCS) form CPA-106 once the Applicant's Preferred/LEDPA corridor is selected.

Table 4-9. Prime Farmland Impacts for Detailed Study Alternatives

	Detailed Study Alternatives[1]													
	1		1A		2		4		4A		7		8	
	Total		Total		Total		Total		Total		Total		Total	
	SC	NC	SC	NC	SC	NC	SC	NC	SC	NC	SC	NC	SC	NC
Prime Farmland Impact (acres)	967.8		738.2		1,014.5		910.9		681.3		845.3		932.5	
	194.4	773.4	194.4	543.8	194.4	820.1	126.4	784.5	126.4	554.9	129.7	715.6	147.3	785.2

[1]Impact calculations are based on functional design slope stake limits plus 40-foot buffer.

4.3.4.1 Agricultural Resources

Impacts to agricultural resources would occur with all of the Detailed Study Alternatives. Table 4-10 shows the anticipated impacts to existing agricultural land and farmland uses with each of the seven Detailed Study Alternatives. Table 4-10 also shows the total estimated roadway footprint for each of the Detailed Study Alternatives, along with the percentage of the roadway footprint that includes agricultural land and farmland uses.

Table 4-10. Existing Agricultural Land/Farmland Uses Impacts for Detailed Study Alternatives

	Detailed Study Alternatives[1]						
	1	1A	2	4	4A	7	8
Agricultural Land/Farmland Uses Impacts (acres)	676.8	494.7	354.9	599.3	417.3	175.6	183.3
Roadway Footprint (acres)	1,466	1,238	1,456	1,404	1,176	1,273	1,473
Percent of Roadway Footprint in Agricultural Land/Farmland Uses	46.2%	40.0%	24.4%	42.7%	35.5%	13.8%	12.4%

[1]Impact calculations are based on functional design slope stake limits plus 40-foot buffer.

4.3.4.2 Voluntary Agricultural Districts

All of the Detailed Study Alternatives would impact farms that participate in the Brunswick County Voluntary Agricultural Districts (VAD) program. VAD properties would be impacted by right-of-way acquisition with all of the Detailed Study Alternatives, and some land within VAD properties may also be

temporarily converted to non-agricultural uses as part of a temporary construction easement. Table 4-11 shows the anticipated impacts to VAD properties with each of the seven Detailed Study Alternatives, as well as the number of VAD parcels impacted. If right-of-way is acquired from a VAD property through eminent domain, the Brunswick County VAD Ordinance requires NCDOT to request that the Agricultural Advisory Board hold a public hearing on the proposed condemnation before condemnation may be initiated. Any VAD lands converted to non-agricultural use as part of a temporary construction easement must be returned to farmable condition by the project's completion.

Table 4-11. Brunswick County Voluntary Agricultural Districts Impacts for Detailed Study Alternatives

	Detailed Study Alternatives[1]						
	1	1A	2	4	4A	7	8
VAD Impacts (acres)	175	114	124	108	108	80	88
Number of VAD Parcels Impacted	33	23	27	23	23	18	16

[1]Impact calculations are based on functional design slope stake limits plus 40-foot buffer.

4.3.5 Utility Impacts

An initial assessment of the utility impacts as a result of the proposed project was conducted. Details of the methodology and investigations are documented in the *Utility Tech Memo, Carolina Bays Parkway Extension Project, Brunswick County, NC & Horry County, SC* (STV, November 2023), which is appended by reference. All of the Detailed Study Alternatives will impact both private and public utilities. Impacts will include the relocation, adjustment, or modification of gas, water, electric, sewer, telephone, and fiber optic cable lines. The relocation of power poles also will be required as a result of the proposed project. The technical memorandum also includes a utility impact risk analysis for the each of the seven Detailed Study Alternatives (see Table 4-12). The results of this analysis are reported in terms of the potential costs of water, sewer, gas, power, and telecommunication utility relocations for each utility owner within the study area. The analysis is based on utility mapping developed from record drawings provided by the utility owners in relation to each Detailed Study Alternative. This is a high-level assessment and will need to be refined as more information is confirmed through subsurface utility engineering (SUE) surveys after the selection of the Applicant's Preferred/LEDPA corridor.

All of the Detailed Study Alternatives would require the relocation of a Santee Cooper electric substation for the Bay Tree subdivision located on Gusta Road in the southeast quadrant of the existing SC 31/SC 9 interchange. Alternatives 1, 1A, and 2 would require the relocation of driveway access to a water tower owned by Little River Water and Sewerage Company located in the southeast quadrant of the Wampee Road/Little River Road intersection. Alternatives 1, 2, 4, 7, and 8 would require the relocation of a telecommunication tower located on the north side of US 17 just east of the NC 904 intersection. Alternatives 1, 1A, 4, and 4A would require the relocation of driveway access to a telecommunication tower located on the east side of Ash Little River Road just south of the No. 5 School Road intersection. Alternatives 1A and 4A would also require the relocation of a telecommunication tower located on the west side of NC 904 just north of the Russtown Road intersection.

E.O.s 13212 and 13302 require Federal agencies to take actions to expedite projects which will increase the production, transmission, or conservation of energy, or which strengthen pipeline safety. The subject project is not energy-related, therefore E.O.s 13212 and 13302 do not apply.

Table 4-12. Utility Impact Risk Analysis for Detailed Study Alternatives

Utility Type	Utility Owner	Detailed Study Alternatives*						
		1	1A	2	4	4A	7	8
Water	Town of Little River	High	High	High	High	High	High	High
	Town of Shallotte	Med-Low	Low	Med-Low	Med-Low	Low	Med-Low	Med-Low
	Brunswick County	High	High	High	High	High	High	High
Sewer	Town of Little River	High	High	High	High	High	High	High
	Town of Shallotte	High	Med-Low	High	High	Med-Low	High	High
	Brunswick County	High	Med-Low	High	High	Med-Low	High	High
Gas	Dominion Energy	Med-Low	Med-Low	Med-Low	Med-Low	Med-Low	Med-Low	Med-Low
Power – Distribution	Brunswick EMC	High	Med-High	High	High	Med-High	High	High
	Horry Electric	High	High	High	High	High	High	High
	Santee Cooper	Med-Low	Med-Low	Med-Low	Med-Low	Med-Low	Med-Low	Med-Low
Power – Transmission	Santee Cooper	High	High	High	High	High	High	High
	Brunswick EMC	High	High	High	High	High	High	High
Communications	AT&T Transmission	Low	Low	Low	Low	Low	Low	Low
	ATMC	High	High	High	High	High	High	High
	Charter	Med-Low	Med-Low	Med-Low	Med-Low	Med-Low	Medium	Med-High
	Frontier	Low	Low	Low	Low	Low	Low	Low
	Horry County	Med-High	Med-High	Med-High	Med-High	Med-High	Med-High	Med-High
	Horry Telephone	Med-Low	Med-Low	Med-Low	Low	Low	Low	Med-Low
	Windstream	Med-Low	Low	Low	Low	Low	Low	Med-Low
	Telecom Towers	Med-Low	Med-Low	Low	Low	Med-Low	Med-Low	Low

*Notes:

- This analysis is based on utility mapping developed from record drawings provided by the utility owners in relation to each Detailed Study Alternative. This is a high-level assessment and will need to be refined as more information is confirmed through subsurface utility engineering (SUE) surveys after the selection of the Applicant's Preferred/LEDPA corridor. Additional information is contained in the *Utility Tech Memo, Carolina Bays Parkway Extension Project, Brunswick County, NC & Horry County, SC* (STV, November 2023).
- Low – <$1 million; Medium-Low – $1 million to $2 million; Medium – $2 million to $3 million; Medium-High – $3 million to $4 million; High – >$4 million.

4.3.6 Hazardous Materials Impacts

As discussed in Section 3.3.5, a Phase I field investigation identified 33 geoenvironmental sites of concern within the study area. Table 4-13 summarizes the impacts to the geoenvironmental sites within the study area for each of the seven Detailed Study Alternatives and the sites are shown on Figure 19. It should also be noted that additional hazardous material investigations will be required along the segments of both Construction Phase 1 scenarios that are outside the original limits of the Phase I field investigation. These include sections of Hickman Road, Calabash Road, and Ash Little River Road in Brunswick County and S-111, Mineola Avenue, and US 17 in Horry County. A preliminary desktop analysis of these areas indicates the presence of at least one additional potential hazardous material site within the footprint of CP1 – S1 (i.e., underground storage tanks at Circle K Gas Station, 1599 US 17, Little River).

Table 4-13. Geoenvironmental Site Impacts for Detailed Study Alternatives

Geoenvironmental Site	Detailed Study Alternatives						
	1	1A	2	4	4A	7	8
South Carolina							
Bell & Bell, 2491 SC 9, Little River	X	X	X	X	X	X	X
Black's Tire & Auto, 3456 Sea Mountain Hwy, Little River	X	X	X	X	X	X	X
Vacant Store, 1120 S-57, Little River	X	X	X				
North Carolina							
Indigo Farms Produce Market, 1542 Hickman Road, Calabash	X	X	X	X	X		
Movementworks, 9500 US 17, Calabash							X
Plantation Storage, 9019 US 17, Calabash			X			X	X
Wayne's Backhoe Service, 20 Thomasboro Road, Calabash			X			X	X
Quality Auto Repair, 15 Thomasboro Road, Calabash			X			X	X
NCDOT Right-of-Way, US 17/ Thomasboro Road/Pea Landing Road, Sunset Beach			X			X	X
Vacant Gas Station, 8550 US 17, Sunset Beach			X				X
RD Automotive, 7245 US 17, Sunset Beach	X		X	X		X	X
McDonald's, 7105 US 17, Sunset Beach	X		X	X		X	X
Circle K 28769, 7095 US 17, Ocean Isle Beach	X		X	X		X	X
Greens Oyster Co., Inc. Overflow Lot, 7051 US 17, Ocean Isle Beach	X		X	X		X	X
Golf Cart Outlet, 7102 US 17, Sunset Beach	X		X	X		X	X
Vacant Lot (Former ACME Convenience Mart), 7096 US 17, Ocean Isle Beach	X		X	X		X	X
Julie's Rentals, 7080 US 17, Ocean Isle Beach	X		X	X		X	X
Golf Cart Outlet Repair Shop, 119 NC 904, Ocean Isle Beach	X		X	X		X	X
Somersett Property, 700 NC 904, Ocean Isle Beach		X			X		

Table 4-13. Geoenvironmental Site Impacts for Detailed Study Alternatives (continued)

Geoenvironmental Site	Detailed Study Alternatives						
	1	1A	2	4	4A	7	8
Phoenix Landscape, 687 NC 904, Ocean Isle Beach		X			X		
Yandle Truck Sales, 6449 US 17, Ocean Isle Beach	X		X	X		X	X
Ocean Isle Collision, 6459 US 17, Ocean Isle Beach	X		X	X		X	X
Jim's Car Care, 6289 US 17, Ocean Isle Beach	X		X	X		X	X
Minute Man 33, 20 Naber Drive, Shallotte	X		X	X		X	X
Mo Joe Auto Repair & Salvage, 5651 Main Street, Shallotte	X		X	X		X	X
Scotchman 3177, 359 Whiteville Road, Shallotte	X	X	X	X	X	X	X
NCDOT Right-of-Way (Former Han-Dee Hugo 9), Exit Ramp SB US 17 & NC 130, Shallotte	X	X	X	X	X	X	X
Beach Tire & Auto, 457 Whiteville Road, Shallotte	X		X	X		X	X
Total Geoenvironmental Site Impacts	20	8	25	19	7	22	24

Preliminary site assessments to identify the nature and extent of any contamination will be performed on these sites prior to right-of-way acquisition. All of the sites are anticipated to present low geoenvironmental impacts. In addition, low monetary and scheduling impacts are anticipated as a result of impacts to all of the identified sites.

4.3.7 Mineral Resources

Two properties containing permitted active sand and gravel mining operations in Brunswick County are crossed by the seven Detailed Study Alternatives. Benton Tract Sand Mine is located in the northwest quadrant of the proposed Carolina Bays Parkway Extension/Pea Landing Road interchange for Alternatives 1 and 4 (see Figure 19). A small portion of land along Pea Landing Road would be taken from the mine property as a result of the realignment of the road through the proposed interchange. Alternatives 1A and 4A would cross the southeastern corner of Simmons Mine off of Tryon Road (see Figure 19). The current extent of sand and gravel mining activities at these sites will not be impacted by the project.

Section 4.7.9 discusses the construction impacts of the proposed project with respect to borrow and disposal sites. The estimated amount of borrow and/or waste associated with the construction of the proposed project is calculated during the final design phase. During the construction phase of the project, the contractor uses this information to determine the specific borrow and/or disposal sources and sites needed to meet the project's mineral (i.e., sand, gravel, etc.) needs. The contractor may

acquire borrow materials from appropriately permitted, commercially operated borrow pits, or from borrow pits located and established by the contractor with appropriate permits, including permits for borrow and waste activities that impacts Waters of the United States.

4.3.8 Floodplain/Floodway Impacts

All of the Detailed Study Alternatives cross 100-year floodplains and floodways in Brunswick County, North Carolina, but there are no crossings of floodplains or floodways in Horry County, South Carolina. Table 4-14 shows the anticipated impacts of the seven Detailed Study Alternatives on 100-year floodplains and floodways, as well as evaluation features in accordance with 23 CFR 650A (Location and Hydraulic Design of Encroachments on Flood Plains), Section 650.111 (Location hydraulic studies).

Table 4-14. 100-Year Floodplain and Floodway Impacts for Detailed Study Alternatives

	Detailed Study Alternatives[1]													
	1		1A		2		4		4A		7		8	
	Total		Total		Total		Total		Total		Total		Total	
	SC	NC	SC	NC	SC	NC	SC	NC	SC	NC	SC	NC	SC	NC
100-year Floodplain (acres)[2]	101.2		69.5		157.9		102.0		70.2		85.1		99.6	
	0.0	101.2	0.0	69.5	0.0	157.9	0.0	102.0	0.0	70.2	0.0	85.1	0.0	99.6
Floodway (acres)	0.3		0.4		0.3		0.3		0.4		0.3		0.3	
	0.0	0.3	0.0	0.4	0.0	0.3	0.0	0.3	0.0	0.4	0.0	0.3	0.0	0.3
Encroachment Type	Transverse		Transverse		Transverse		Transverse		Transverse		Transverse		Transverse	
Risks	None		None		None		None		None		None		None	
Emergency Response/ Evacuation Impact	None		None		None		None		None		None		None	
Floodplain Values Impact	No Significant		No Significant		No Significant		No Significant		No Significant		No Significant		No Significant	
Compatibility with Floodplain Planning	Compatible		Compatible		Compatible		Compatible		Compatible		Compatible		Compatible	

[1]Impact calculations are based on functional design slope stake limits plus 40-foot buffer.
[2]Approximately 5.4 acres of the floodplain impact shown in North Carolina would occur with all of the Detailed Study Alternatives (except for Alternative 8) using CP1 – S2 only.

Both Horry County, South Carolina and Brunswick County, North Carolina are participants in the National Flood Insurance Program (NFIP). The NCDOT Hydraulics Unit will coordinate with the NC Floodplain Mapping Program (FMP), the delegated North Carolina state agency for administering the Federal Emergency Management Agency's (FEMA's) NFIP, to determine the status of the project with regard to applicability of NCDOT's Memorandum of Agreement with NC FMP (dated April 22, 2013, modified February 5, 2015), or approval of a Conditional Letter of Map Revision (CLOMR) and subsequent final Letter of Map Revision (LOMR).

This project involves construction activities on or adjacent to FEMA-regulated streams in North Carolina. Therefore, NCDOT Division 3 shall submit sealed as-built construction plans to the NCDOT Hydraulics Unit upon completion of project construction, certifying that the drainage structure(s) and roadway embankment that are located within the 100-year floodplain were built as shown in the construction plans, both horizontally and vertically.

4.3.8.1 Floodplain Avoidance and Minimization Efforts Alternatives

Floodplain impacts are unavoidable, as the floodplain limits traverse the entire study area in the North Carolina portion of the project. The existing floodplain also crosses existing US 17, so that any alternatives that would improve US 17 would impact the floodplain. Any alternatives that would not impact the floodplain would involve extraordinary project length or elevation changes, which would render those alternatives impractical from a cost standpoint or would not meet the purpose and need of the project, due to the distance those alternatives would be located outside the immediate project area. Therefore, there are no practical alternatives to avoid floodplain impacts.

A longitudinal encroachment is defined by the FHWA to be an encroachment that is parallel to the direction of flow. None of the Detailed Study Alternatives represent a longitudinal encroachment because they all cross the floodplain perpendicular to the flow. The encroachment type for all of the Detailed Study Alternatives is transverse.

During the development of the alignment and design of the Detailed Study Alternatives, efforts were made to avoid and minimize impacts to 100-year floodplains wherever practicable, including generally locating crossings of the 100-year floodplain surrounding Cawcaw Swamp and Shingletree Swamp at the narrowest portion of the floodplain in the vicinity of the new location alignments and bridging these crossings. The project's Section 404/NEPA Merger Team reviewed and concurred on the size and locations of major hydraulics structures as part of the merger concurrence process being used to develop the project. As shown in Table 2-2, bridges are proposed at all major hydraulic sites where the Detailed Study Alternatives have a new location crossing of the 100-year floodplain surrounding Cawcaw Swamp and Shingletree Swamp.

4.3.8.2 Flood Risk Evaluation

There is no significant change in flood "Risk" associated with this project. All of the Detailed Study Alternatives include major hydraulic crossings in a FEMA detailed study Special Flood Hazard Zone in North Carolina. Hydraulic design for these crossings shall meet requirements set forth by FEMA's NFIP, the NC FMP, and NCDOT for major hydraulic crossings to ensure that there are no adverse impacts to any upstream and downstream insurable structures located within the floodplains or floodways. Proposed crossings of FEMA regulated floodplains as part of this project will not result in obstruction or alteration of flood flows or flood elevations and will not create constraints in flow. Further detailed modeling and hydraulic analysis will be completed once more detailed survey information is provided for the Selected Alternative during the Final Design phase of the project.

4.3.8.3 Emergency Response/Evacuation Impact

None of the Detailed Study Alternatives will impede emergency response or evacuation activities. In fact, all of the Detailed Study alternatives would improve mobility and roadway connectivity in the project study area, and would therefore support more efficient clearance times during emergency evacuations, and decrease emergency response times.

4.3.8.4 Floodplain Values Impacts

Natural and beneficial floodplain values are defined by the FHWA to include, but are not limited to: fish, wildlife, plants, open space, natural beauty, scientific study, outdoor recreation, agriculture, aquaculture, forestry, natural moderation of floods, water quality maintenance, and groundwater recharge. No significant impacts are anticipated to floodplain values for any of the Detailed Study Alternatives.

4.3.8.5 Support of Incompatible Development

Incompatible floodplain development is defined as development that is not consistent with a community floodplain development plan (FHWA Technical Advisory T 6640.8A, 1987). In 1986, Brunswick County adopted a Flood Damage Prevention Ordinance along with the Flood Insurance Rate Maps (FIRMs), thereby entering into the NFIP. The purpose of the ordinance is to promote public health, safety, and general welfare and to minimize public and private losses due to flood conditions within flood prone areas. Brunswick County's Floodways and Non-Encroachment Areas guidance designates floodways or non-encroachment areas within Special Flood Hazard Areas and further designates the following provisions within the Special Flood Hazard Areas:

(1) No encroachments, including fill, new construction, substantial improvements and other developments shall be permitted unless: (a) It is demonstrated that the proposed encroachment would not result in any increase in the flood levels during the occurrence of the base flood discharge, based on hydrologic and hydraulic analyses performed in accordance with standard engineering practice and presented to the Floodplain Administrator prior to issuance of floodplain development permit; or (b) A Conditional Letter of Map Revision (CLOMR) has been approved by FEMA. A Letter of Map Revision (LOMR) must also be obtained within six months of completion of the proposed encroachment.

(2) If Article 7.1.5, Section F(1) is satisfied, all development shall comply with all applicable flood hazard reduction provisions of this ordinance.

It is not anticipated that any of the Detailed Study Alternatives will result in an increase of flood levels. Further detailed modeling and hydraulic analysis will be completed once more detailed survey information is provided for the Selected Alternative during the Final Design phase of the project. The NCDOT Hydraulics Unit will coordinate with the NC FMP, the delegated North Carolina state agency for administering FEMA's NFIP, to determine the status of the project with regard to applicability of NCDOT's Memorandum of Agreement with NC FMP (dated April 22, 2013, modified February 5, 2015), or approval of a CLOMR and subsequent final LOMR.

4.3.9 Protected Lands Impacts

4.3.9.1 Wild and Scenic Rivers

As noted in Section 3.3.8.1, no Wild and Scenic Rivers are located within the study area.

4.3.9.2 State/National Forests

As noted in Section 3.3.8.2, no state or national forests are located within the study area.

4.3.9.3 Preservation Areas

There will be no impacts to the preservation areas located within the study area with any of the Detailed Study Alternatives. Additional information regarding these sites is included in Section 3.3.8.3.

4.4 Cultural Resources Impacts for Detailed Study Alternatives

4.4.1 Historic Architectural Resources

As described in Section 3.4.1, there are two resources within the original 2021 Area of Potential Effects (APE) for the South Carolina portion of the Carolina Bays Parkway Extension study area that were determined eligible for listing on the National Register of Historic Places (NRHP) (Old Mount Calvary Cemetery and Gore-Skipper Property Tobacco Barn). There are also two resources within the original 2021 APE for the North Carolina portion of the study area that were determined eligible for listing on the NRHP (Shallotte Prison Camp and Somersett-Platt House). As described in Section 3.4.1, no resources within the expanded 2023 APE for CP1 – S2 in North Carolina were determined eligible for listing on the NRHP. However, one resource that is within the expanded 2023 APE for CP1 – S1 in South Carolina (Little River United Methodist Church Cemetery, see description in Section 3.4.1) will require further review to determine its potential eligibility for the NRHP.

The potential effect of the proposed project on historic architectural resources was evaluated in accordance with Section 106 of the National Historic Preservation Act, and the effects determinations are summarized for each of the seven Detailed Study Alternatives in Table 4-15. Note that the Little River United Methodist Church Cemetery is not included in Table 4-15 since this resource will require further review to determine its potential eligibility for the NRHP. However, potential impacts to the cemetery would occur with all of the Detailed Study Alternatives using CP1 – S1, but would not occur with any of the Detailed Study Alternatives using CP1 – S2.

Table 4-15. Historic Architectural Resource Effects for Detailed Study Alternatives

Historic Property	Detailed Study Alternatives						
	1	1A	2	4	4A	7	8
South Carolina							
Old Mount Calvary Cemetery	No Adverse Effect	No Adverse Effect	No Adverse Effect	No Adverse Effect	No Adverse Effect	No Adverse Effect	No Adverse Effect
Gore-Skipper Property Tobacco Barn	No Adverse Effect	No Adverse Effect	No Adverse Effect	No Adverse Effect	No Adverse Effect	No Adverse Effect	No Adverse Effect
North Carolina							
Shallotte Prison Camp	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Somersett-Platt House	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect

The South Carolina State Historic Preservation Officer (HPO) concurred with these effects determinations on July 15, 2022. A copy of the concurrence letter is included in Appendix B. The North Carolina State HPO concurred with these effects determinations at a meeting held on May 26, 2022. A copy of the concurrence form is also included in Appendix B.

4.4.2 Archaeological Resources

As noted in Section 3.4.2, detailed archaeological surveys will be conducted for the project following selection of the Applicant's Preferred/LEDPA corridor by the interagency Merger Team. The results of these archaeological surveys will be discussed in the FEIS.

4.4.3 Tribal Lands

As noted in Section 3.4.3, there are no American Indian tribal lands within the study area. In accordance with E.O. 13175, it has been determined that the project will have no substantial direct effect on one or more Indian tribes.

4.5 Section 4(f) and Section 6(f) Resources for Detailed Study Alternatives

The Section 4(f) resources within the study area are discussed in Section 3.5 and listed in Table 3-12. The Section 4(f) resources within the study area are also shown on Figure 25. None of the seven Detailed Study Alternatives would impact any of these Section 4(f) resources. Section 4(f) protection also does not apply to the two NRHP-eligible historic architectural resources within the South Carolina portion of the study area (Old Mount Calvary Cemetery and Gore-Skipper Property Tobacco Barn), which both have Section 106 determinations of No Adverse Effect, since the proposed project would not permanently incorporate land from these resources. As discussed in Section 4.4.1, one historic architectural resource that is within the expanded 2023 APE for CP1 – S1 in South Carolina (Little River United Methodist Church Cemetery) will require further review to determine its potential eligibility for the NRHP. If this resource is determined to be NRHP-eligible, it will also be reviewed further for possible Section 4(f) evaluation. Potential impacts to the cemetery would occur with all of the Detailed Study Alternatives using CP1 – S1, but would not occur with any of the Detailed Study Alternatives using CP1 – S2.

As discussed in Section 3.5, the only Section 6(f) resource within the study area is the Shallotte Township District Park. The Detailed Study Alternatives would not impact this Section 6(f) resource.

4.6 Impacts to the Natural Environment for Detailed Study Alternatives

4.6.1 Soils/Topographical/Geological Impacts

There are geotechnical engineering concerns associated with portions of all seven of the Detailed Study Alternatives due to the soft organic soils in the floodplains adjacent to swamp and creek crossings in North Carolina. Soil improvement techniques may be necessary for the organic soils in order to control differential settlement. Side slopes of 3:1 or flatter are needed to establish vegetation and assist in erosion control. Additional subsurface drainage may be necessary to assist in drainage and/or consolidation of very wet or soft soils.

4.6.2 Terrestrial Communities and Wildlife Impacts

4.6.2.1 Terrestrial Community Impacts

Impacts to terrestrial communities resulting from land clearing are unavoidable. Project construction activities in or near terrestrial resources have the potential to impact the biological function of these resources. Table 4-16 shows the anticipated impacts of the seven Detailed Study Alternatives on terrestrial communities (see Figure 22).

Table 4-16. Terrestrial Community Impacts for Detailed Study Alternatives

Terrestrial Community Impacts (acres)	Detailed Study Alternatives[1,2]													
	1		1A		2		4		4A		7		8	
	Total		Total		Total		Total		Total		Total		Total	
	SC	NC	SC	NC	SC	NC	SC	NC	SC	NC	SC	NC	SC	NC
Maintained/ Disturbed	934.9		643.9		980.7		853.9		562.9		775.7		885.0	
	165.4	769.5	165.4	478.5	165.4	815.3	74.8	779.1	74.8	488.1	68.0	707.7	138.5	746.5
Mesic Mixed Hardwood Forest	60.3		75.6		65.1		63.9		79.2		66.6		169.8	
	26.1	34.2	26.1	49.5	26.1	39.0	29.7	34.2	29.7	49.5	31.9	34.7	123.1	46.7
Pine/Scrub Oak Sandhill	80.9		124.6		71.6		102.2		145.9		96.6		80.7	
	36.0	44.9	36.0	88.6	36.0	35.6	52.2	50.0	52.2	93.7	58.1	38.5	37.9	42.8
Wet Pine Flatwood	84.1		81.5		78.0		100.2		97.6		119.2		54.7	
	73.4	10.7	73.4	8.1	73.4	4.6	89.5	10.7	89.5	8.1	87.4	31.8	24.8	29.9
Coastal Plain Bottomland Hardwoods	71.3		57.5		65.6		74.1		60.3		66.5		78.1	
	15.7	55.6	15.7	41.8	15.7	49.9	18.4	55.7	18.4	41.9	17.5	49.0	14.5	63.6
Coastal Plain Small Stream Swamp	50.9		46.0		45.0		50.9		46.0		34.7		32.6	
	0.0	50.9	0.0	46.0	0.0	45.0	0.0	50.9	0.0	46.0	0.0	34.7	0.0	32.6
Pine Plantation	53.9		57.7		20.6		39.1		42.9		4.0		2.6	
	15.3	38.6	15.3	42.4	15.3	5.3	0.0	39.1	0.0	42.9	0.0	4.0	0.0	2.6
Pond Pine Woodland	31.1		26.7		26.4		21.9		17.5		9.5		3.2	
	1.6	29.5	1.6	25.1	1.6	24.8	1.2	20.7	1.2	16.3	1.2	8.3	1.1	2.1
Open Water	6.4		17.4		8.1		5.2		16.3		9.6		7.5	
	3.7	2.7	3.7	13.7	3.7	4.4	2.7	2.5	2.7	13.6	3.5	6.1	3.8	3.7
Cypress-Gum Swamp	11.9		21.8		17.3		12.4		22.3		14.4		14.4	
	0.0	11.9	0.0	21.8	0.0	17.3	0.0	12.4	0.0	22.3	0.0	14.4	0.0	14.4
Non-Riverine Swamp Forest	5.6		5.6		5.6		4.4		4.4		2.1		2.5	
	5.6	0.0	5.6	0.0	5.6	0.0	4.4	0.0	4.4	0.0	2.1	0.0	2.5	0.0
High Pocosin	0.0		3.0		0.0		0.0		3.0		0.0		5.5	
	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0	5.5	0.0

Table 4-16. Terrestrial Community Impacts for Detailed Study Alternatives (continued)

Terrestrial Community Impacts (acres)	Detailed Study Alternatives[1,2]													
	1		1A		2		4		4A		7		8	
	Total		Total		Total		Total		Total		Total		Total	
	SC	NC	SC	NC	SC	NC	SC	NC	SC	NC	SC	NC	SC	NC
Other Wetland	3.0		5.2		0.2		4.1		6.3		2.3		3.1	
	0.0	3.0	0.0	5.2	0.0	0.2	1.1	3.0	1.1	5.2	1.1	1.2	0.0	3.1
Xeric Sandhill Scrub	0.1		0.1		0.1		0.1		0.1		0.1		4.0	
	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.1	3.9	0.1
Bald Cypress Tupelo Gum Swamp	0.6		0.6		0.6		0.6		0.6		0.6		0.6	
	0.6	0.0	0.6	0.0	0.6	0.0	0.6	0.0	0.6	0.0	0.6	0.0	0.6	0.0
Total	1,395.2		1,167.4		1,385.1		1,333.3		1,105.5		1,202.1		1,344.3	
	343.5	1,051.7	343.5	823.9	343.5	1,041.6	274.7	1,058.6	274.7	830.8	271.5	930.6	356.4	987.9

[1]Impact calculations are based on functional design slope stake limits plus 40-foot buffer. The numbers in this table were rounded to the nearest tenth of an acre, so minor rounding error may exist when adding the individual numbers to get the totals.
[2]Additional terrestrial community surveys will be required for the portion of CP1 – S1 that is outside the footprint of the Detailed Study Alternatives in South Carolina.

4.6.2.2 Terrestrial Wildlife Impacts

Temporary fluctuation in populations of animal species which use terrestrial areas is anticipated during the course of construction. Slow-moving, burrowing, and subterranean organisms will be directly impacted by construction activities, while mobile organisms will be displaced to adjacent communities. Habitat reduction can occur when project construction affects undisturbed areas surrounding an existing man-dominated environment. When this occurs, competitive forces in the adapted communities will result in a redefinition of population equilibrium.

The Detailed Study Alternatives that have less construction on new location would impact less wildlife habitat than the Detailed Study Alternatives that would be constructed on new location for longer distances. Alternative 8 would have the least construction on new location.

Fragmentation and loss of forested habitat may impact wildlife in the area by reducing potential nesting and foraging areas, as well as displacing animal populations. Forested areas provide connectivity between populations, allowing for gene flow, as well as a means of safe travel from one foraging area to another. Table 4-17 shows the anticipated impacts of the seven Detailed Study Alternatives on forests within the alternative corridors.

Brunswick County ranked eleventh in the state of North Carolina for total animal/vehicle crashes between 2020 and 2022. Overall, 1,322 animal crashes were reported during the 2020 to 2022 time period. This is slightly more than half (51 percent) of the animal/vehicle crashes reported by urbanized Wake County, which is ranked first in the state. According to traffic crash data obtained for major North Carolina routes within the study area for the five-year period between April 2013 and March 2018, there were 1,174 total crashes. The six most prevalent crash types were: rear-end, fixed object, left-turn,

Table 4-17. Forest Impacts for Detailed Study Alternatives

	Detailed Study Alternatives[1,2]													
	1		1A		2		4		4A		7		8	
	Total		Total		Total		Total		Total		Total		Total	
	SC	NC	SC	NC	SC	NC	SC	NC	SC	NC	SC	NC	SC	NC
Forest Impacts (acres)	450.9		497.8		396.0		470.0		516.9		414.4		443.1	
	174.4	276.5	174.4	323.4	174.4	221.7	196.0	273.9	196.0	320.9	198.8	215.6	208.5	234.6

[1]Impact calculations are based on functional design slope stake limits plus 40-foot buffer. The numbers in this table were rounded to the nearest tenth of an acre, so minor rounding error may exist when adding the individual numbers to get the totals.
[2]Additional terrestrial community surveys will be required for the portion of CP1 – S1 that is outside the footprint of the Detailed Study Alternatives in South Carolina.

angle, sideswipe, and animal. Animal-related crashes (225) accounted for approximately 19 percent of the total crashes during the five-year period. US 17 had the highest number of animal-related crashes (103) of the North Carolina routes analyzed during this five-year period, which accounted for approximately 16 percent of the total US 17 crashes (629). According to South Carolina traffic collision data for 2021, "animal in road" was a top five contributing factor for traffic collisions in almost two thirds (30 of 46) of the State's counties, but it was not a top five contributing factor in Horry County. The top two contributing factors for traffic collisions in Horry County in 2021 were "driving too fast for conditions" and "failed to yield right of way." According to traffic crash data obtained for major South Carolina routes within the study area for the period between January 2012 and September 2017, there were 1,962 total crashes. Animal-related crashes (25) were not among the four most prevalent crash types during this period (rear end, angle, sideswipe, and ran off road) and accounted for only approximately one percent of total crashes.

Animal crashes are typical in rural and suburban areas, especially where no measures have been deployed to prevent animal crossings of existing non-controlled access roadways. All of the Detailed Study Alternatives include proposed bridges at the new location crossings of the 100-year floodplain surrounding Cawcaw Swamp and Shingletree Swamp, and these bridges would also serve as wildlife underpasses in these expansive natural areas. The other proposed bridges and overpasses along the proposed project route would also provide locations for animal crossings. No major animal migration routes have been identified to date within the project area by members of the project's Merger Team or by other project stakeholders. Project planners and designers will continue to work with resource agencies through the NEPA/Section 404 Merger Process and will consider additional measures to reduce animal/vehicle collisions if, and as, recommended through the Merger Process going forward. Although animal/vehicle crashes will likely occur as a result of this project, they are no more likely to occur on the proposed project corridor than anywhere else.

4.6.3 Water Resources Impacts

Primary sources of water quality degradation in urban and developed areas are non-point sources of discharge, which include surface water runoff and runoff from construction activities. Short-term impacts to water quality from construction-related activities include increased sedimentation and turbidity in nearby water resources. Long-term impacts include substrate destabilization, bank erosion, increased turbidity, altered flow rates, and possible temperature fluctuations within the channel due to removal of streamside vegetation.

The removal of streamside vegetation and placement of fill material during construction contributes to erosion and possible sedimentation. Erosion and sedimentation may carry soils, toxic compounds, trash, and other materials into the aquatic communities at the construction site. As a result, sand bars may be formed both at the site and downstream. Increased light penetration from the removal of streamside vegetation may also increase water temperatures. Warmer water contains less oxygen, thus reducing aquatic life that depends on high oxygen concentrations. Quick revegetation of these areas helps to reduce the impacts by supporting the underlying soils.

Each of the seven Detailed Study Alternatives for the proposed project will impact surface waters, wetlands, and ponds, as described in the sections below. Construction activities associated with the project will strictly follow NCDOT's *Best Management Practices for Construction and Maintenance Activities* (BMP-CMA) and *Protection of Surface Waters* (BMP-PSW), as well as the South Carolina Department of Health and Environmental Control's (SCDHEC) Storm Water Management BMP Field Manual. Sedimentation control guidelines will be strictly enforced during the construction stages of the project.

4.6.3.1 Wells

There would be no impacts to the public water supply wells or the Public Water Supply Well Protection Zones located within the study area with any of the Detailed Study Alternatives. Additional information regarding these features is included in Section 3.6.3.1.

4.6.3.2 Surface Water Impacts

4.6.3.2.1 Stream Impacts

As discussed in Section 3.6.3.2.1, a total of 109 potential jurisdictional streams were identified within the corridors for the seven Detailed Study Alternatives (see Figure 23). However, additional stream surveys will be required for the portion of CP1 – S1 that is outside of the footprint of the Detailed Study Alternatives in South Carolina. Total stream impacts for each Detailed Study Alternative are shown in Table 4-18, and anticipated impacts by individual stream are presented in Table E-4 in Appendix E.

Table 4-18. Total Stream Impacts for Detailed Study Alternatives

	Detailed Study Alternatives[1]													
	1		1A		2		4		4A		7		8	
	Total		Total		Total		Total		Total		Total		Total	
	SC	NC	SC	NC	SC	NC	SC	NC	SC	NC	SC	NC	SC	NC
Delineated Stream Impacts (linear feet)[2,3]	14,818		12,632		9,865		12,590		10,403		8,089		11,469	
	4,909	9,909	4,909	7,723	4,909	4,956	2,673	9,917	2,673	7,730	2,943	5,146	4,613	6,856

[1]Impact calculations are based on functional design slope stake limits plus 40-foot buffer. The numbers in this table were rounded to the nearest linear foot, so minor rounding error may exist when adding the individual numbers to get the totals.
[2]This impact includes 139 feet of estimated impacts to Bellamy Branch in South Carolina. This stream has not been delineated.
[3]Includes estimated impacts from USGS 24K layer.

4.6.3.2.2 Tributaries and Ponds Impacts

As discussed in Section 3.6.3.2.2, a total of 422 potential jurisdictional tributaries and ponds are located within the corridors for the seven Detailed Study Alternatives (see Figure 23). However, additional tributary and pond surveys will be required for the portion of CP1 – S1 that is outside of the footprint of the Detailed Study Alternatives in South Carolina. Total tributaries and ponds impacts for each Detailed Study Alternative are shown in Table 4-19.

Table 4-19. Total Tributaries and Ponds Impacts for Detailed Study Alternatives

	Detailed Study Alternatives[1,2]													
	1		1A		2		4		4A		7		8	
	Total		Total		Total		Total		Total		Total		Total	
	SC	NC	SC	NC	SC	NC	SC	NC	SC	NC	SC	NC	SC	NC
Delineated Tributary Impacts (linear feet)	15,145		15,682		12,975		15,312		15,849		10,613		8,947	
	1,125	14,020	1,125	14,556	1,125	11,850	1,870	13,442	1,870	13,978	1,733	8,880	1,703	7,244
Delineated Pond Impacts (acres)	6.8		17.5		8.6		5.6		16.4		10.0		7.9	
	3.8	3.0	3.8	13.7	3.8	4.8	2.8	2.8	2.8	13.6	3.6	6.4	3.9	4.0

[1]Impact calculations are based on functional design slope stake limits plus 40-foot buffer. The numbers in this table were rounded to the nearest tenth of an acre for ponds and nearest linear foot for tributaries, so minor rounding error may exist when adding the individual numbers to get the totals.
[2]Additional tributary and pond surveys will be required for the portion of CP1 – S1 that is outside the footprint of the Detailed Study Alternatives in South Carolina.

4.6.3.2.3 Wetland Impacts

As discussed in Section 3.6.3.2.3, a total of 351 potential jurisdictional wetlands are located within the corridors for the seven Detailed Study Alternatives (see Figure 23). However, additional wetland surveys will be required for the portion of CP1 – S1 that is outside of the footprint of the Detailed Study Alternatives in South Carolina. As shown on Figure 23, additional wetlands have been modeled in South Carolina adjacent to S-111, Mineola Avenue, and Wampee Road that would be expected to be impacted by CP1 – S1 if their presence is confirmed by field delineations in the future. Total wetland impacts for each Detailed Study Alternative are shown in Table 4-20. The anticipated impacts by individual wetland, as well as the modeled wetlands impact in South Carolina, are presented in Table E-5 in Appendix E.

Table 4-20. Total Wetland Impacts for Detailed Study Alternatives

	Detailed Study Alternatives[1,2]													
	1		1A		2		4		4A		7		8	
	Total		Total		Total		Total		Total		Total		Total	
	SC	NC	SC	NC	SC	NC	SC	NC	SC	NC	SC	NC	SC	NC
Delineated Wetland Impacts (acres)	150.3		204.5		143.4		162.2		216.5		140.4		139.3	
	45.4	104.9	45.4	159.1	45.4	98.0	57.9	104.3	57.9	158.6	51.4	89.0	39.5	99.8

[1]Impact calculations are based on functional design slope stake limits plus 40-foot buffer. The numbers in this table were rounded to the nearest tenth of an acre, so minor rounding error may exist when adding the individual numbers to get the totals. Impacts include modeled wetlands for CP1 – S1 that have not been field delineated.
[2]Additional wetland surveys will be required for the portion of CP1 – S1 that is outside the footprint of the Detailed Study Alternatives in South Carolina.

4.6.4 Jurisdictional Issues

4.6.4.1 Waters of the United States

4.6.4.1.1 Avoidance and Minimization of Impacts

During the development of the seven Detailed Study Alternatives, efforts were made to avoid and minimize impacts to wetlands, streams, and tributaries, wherever practicable.

Preliminary Corridor Concepts (Section 2.2.4) were established using geographic information systems (GIS) software from Environmental Systems Research Institute (ESRI) to develop a "best path" model for the study area. The model analyzed natural and human environment features, weighted for constraint factors, and generated best path alignments between termini for which potential corridors would generate the least overall impacts. The modeling effort was also supplemented with input from local officials and the NEPA/Section 404 Merger Team. After the model was run for all routes, centerlines were developed to reflect best path alignments using the modeled corridor, roadway design criteria and constructability considerations, aerial photography, field evaluations to verify certain features, and environmental features mapping.

The centerlines were buffered and the Preliminary Corridor Concepts were generated using 1,000-foot-wide corridors to find a best path (i.e., least overall impacts) alignment for the Corridor Concepts. In order to compare the relative impacts of the Preliminary Corridor Concepts prior to developing detailed functional roadway designs, 400-foot-wide corridors, generally 200 feet on each side of the corridor concept centerline, were developed and used to calculate the potential impacts. The 400-foot-wide corridors are more reflective of the anticipated impacts of the proposed project, although as discussed in Section 2.7.3, the actual proposed right-of-way width is generally 300 feet.

The Preliminary Corridor Concepts that met the purpose of and need for the proposed project and with the least impacts to the human and natural environments were identified, and seven Detailed Study Alternatives were selected for detailed evaluation in this DEIS (Section 2.3). The Detailed Study Alternatives selection process incorporated recommendations made by Federal and state environmental regulatory and resource agencies and local municipal stakeholders, as well as comments received from two open house public meetings held in December 2019. The Detailed Study Alternatives were further refined as more comprehensive information was obtained through detailed field studies and environmental analysis.

Because of the number of streams and wetlands present within the study area, total avoidance of surface waters is not practicable. Impacts to wetlands and streams were considered during the selection of the Detailed Study Alternatives. Alignments for the alternatives have been developed within the study corridors that minimize impacts to streams and wetlands. The NEPA/Section 404 Merger Team has concurred on the streams that should be bridged by the new location corridor portions of the seven Detailed Study Alternatives, but the Merger Team has not yet reviewed the portions of the two Construction Phase 1 scenarios that follow existing roads in Brunswick or Horry County, dependent on which scenario is considered. The two Construction Phase 1 scenarios would both provide minimal improvements to existing roads, but they both cross streams and wetlands. NCDOT and SCDOT will attempt to avoid and minimize impacts to streams and wetlands to the greatest extent practicable as more detailed roadway designs are developed for the Applicant's Preferred/LEDPA corridor.

As discussed in Section 3.6.3.2.1, 27 streams within, or within one mile downstream, of the seven Detailed Study Alternative corridors have been designated High Quality Waters (HQW) by the North Carolina Division of Water Resources (NCDWR). All are located within North Carolina and are unnamed tributaries to either Lookout Branch or the Shallotte River. None have been designated Outstanding Resource Waters (ORW) by NCDWR. All of these streams are designated as HQW due to the classification of their receiving waters. Design Standards in Sensitive Watersheds will be implemented for these streams during project design and construction.

4.6.4.1.2 Compensatory Mitigation of Impacts

Per the 2008 US Army Corps of Engineers (USACE) and USEPA Mitigation Rule (i.e., 33 CFR Part 332), compensatory mitigation is the restoration (re-establishment or rehabilitation), establishment (creation), enhancement, and/or in certain circumstances preservation of aquatic resources for the purposes of offsetting unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved.

NCDOT will investigate potential on-site stream and wetland mitigation opportunities once the Applicant's Preferred/LEDPA corridor has been selected. On-site mitigation will be used as much as possible in North Carolina. Offsite mitigation needed to satisfy the Federal Clean Water Act requirements for this project will be provided by the North Carolina Division of Mitigation Services (NCDMS), NCDOT Stream and Wetland In-Lieu Fee Program. If NCDMS cannot provide sufficient credits for all of the required mitigation, private mitigation banks with available credits will be used to supplement credits from NCDMS.

SCDOT uses compensatory mitigation to restore, establish, enhance, or preserve other aquatic resources for unavoidable impacts to Waters of the United States by a transportation project. Per the 2008 USACE and USEPA Mitigation Rule and USACE Charleston District Compensatory Mitigation Guidelines, the hierarchy for consideration of mitigation is based upon the likelihood of mitigation plans being successful and sustainable, which prioritizes mitigation bank credits or in-lieu fee program credits over Permittee-Responsible Mitigation (PRM) options. If a proposed project is located within the primary service area of an existing mitigation bank or in-lieu fee program, the permit applicant will normally be required to purchase the necessary mitigation credits. South Carolina does not have an approved in-lieu fee program established for compensatory mitigation. Once the Applicant's Preferred/LEDPA corridor is selected, SCDOT investigates the availability of stream and wetland mitigation credits at commercial mitigation banks which service the project area. The USACE's Regulatory In-lieu Fee and Bank Information Tracking System (RIBITS) site is used to identify mitigation banks with available credits. Mitigation banks servicing the project area with available credits are then contacted to confirm availability and cost for credits needed.

4.6.4.2 Buffer Impacts

As discussed in Section 3.6.4.2, no North Carolina River Basin Buffer Rules apply to streams within the North Carolina portion of the study area. There are no buffer rules in effect for Horry County, South Carolina.

4.6.4.3 Protected Species Impacts

As discussed in Section 3.6.4.3, as of January 16, 2024, the US Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) tool and the National Oceanic and Atmospheric Administration (NOAA) list 22 Federally-protected species for Horry County and 16 Federally-protected species for Brunswick County under the Endangered Species Act (ESA) of 1973. In addition, one proposed endangered species (tricolored bat) is listed for both counties. Following are the biological conclusions rendered for each of the currently Federally-protected species for the Detailed Study Alternatives based on survey results within the study area. Table 4-21 summarizes the Federally-protected species listed for Horry and Brunswick Counties and the biological conclusion for the likely effect on each species with each of the Detailed Study Alternatives.

American alligator

Biological Conclusion: Not Required

Species listed as threatened due to similarity of appearance do not require Section 7 consultation with the USFWS. Suitable habitat for the American alligator is present in the form of wetlands, canals, ponds, and streams. Although surveys for species listed as threatened due to similarity of appearance are not required, four individuals were observed during field investigations. The individuals were seen within the corridors for Alternatives 7 and 8 in South Carolina and North Carolina. Those present may be temporarily displaced by and during construction activities. The exact locations were recorded for the NC Natural Heritage Program (NHP) and the project file. This species is listed in South Carolina and North Carolina. A review of SC NHP records on January 23, 2023, indicates no known occurrences within 2.0 miles of the study area. A review of NC NHP records on January 23, 2023, indicates one known occurrence within 1.0 mile of the study area.

American chaffseed

Biological Conclusion: No Effect

Suitable habitat for the American chaffseed is present within the study area in the form of highway rights-of-way, roadsides, or on the edge of artificially maintained clearings. No individuals were observed during pedestrian surveys conducted from June 21 to 24, 2021. This species is listed in South Carolina only. A review of SC NHP records on January 23, 2023, indicates no known occurrences within 2.0 miles of the study area. However, additional surveys for this species will be conducted within the parts of the study corridor of CP1 – S1 along S-111 and Mineola Avenue to confirm that this species is not present.

Atlantic sturgeon

Biological Conclusion: No Effect

Suitable habitat for Atlantic sturgeon is not present within the study area as there are no estuarine and riverine habitat of large river systems. This species is listed in South Carolina and North Carolina. A review of SC and NC NHP records on January 23, 2023, indicates no known occurrences within 2.0 miles of the study area.

Table 4-21. Federally-Protected Species Effects for Detailed Study Alternatives

Scientific Name	Common Name	Federal Status	County	Biological Conclusion	Detailed Study Alternatives
Alligator mississippiensis	American alligator	T(S/A)	Horry/Brunswick	Not Required	--
Schwalbea americana	American chaffseed	E	Horry	No Effect	--
Acipenser oxyrinchus	Atlantic sturgeon	E	Horry/Brunswick	No Effect	--
Oxypolis canbyi	Canby's dropwort	E	Horry	Unresolved	--
Thalictrum cooleyi	Cooley's meadowrue	E	Brunswick	No Effect	--
Balaenoptera physalus	Finback whale	E	Horry	No Effect	--
Chelonia mydas	Green sea turtle	T(C/H)	Horry/Brunswick	No Effect	--
Megaptera novaengliae	Humpback whale	E	Horry	No Effect	--
Lepidochelys kempii	Kemp's ridley sea turtle	E	Horry/Brunswick	No Effect	--
Dermochelys coriacea	Leatherback sea turtle	E(C/H)	Horry/Brunswick	No Effect	--
Caretta caretta	Loggerhead sea turtle	T (C/H)	Horry/Brunswick	No Effect	--
Planorbella magnifica	Magnificent ramshorn	E(C/H)	Brunswick	No Effect	--
Myotis septentrionalis	Northern long-eared bat	E	Horry/Brunswick	MA-LAA	All Detailed Study Alternatives
Charadrius melodus	Piping plover	T (C/H)	Horry/Brunswick	No Effect	--
Lindera melissifolia	Pondberry	E	Horry	Unresolved	--
Picoides borealis	Red-cockaded woodpecker	E	Horry/Brunswick	No Effect	--
Calidris canutus rufa	Rufa red knot	T	Horry/Brunswick	No Effect	--
Balaena glacialis	Right whale	E	Horry	No Effect	--
Lysimachia asperulaefolia	Rough-leaved loosestrife	E	Brunswick	No Effect	--
Amaranthus pumilus	Seabeach amaranth	T	Horry/Brunswick	No Effect	--
Balaenoptera borealis	Sei whale	E	Horry	No Effect	--
Acipenser brevirostrum	Shortnose sturgeon	E	Horry	No Effect	--
Physeter macrocephalus	Sperm whale	E	Horry	No Effect	--
Perimyotis subflavus	Tricolored bat	PE	Horry/Brunswick	MA-LAA (NC), Unresolved (SC)	All Detailed Study Alternatives in NC
Trichechus manatus	West Indian manatee	T(C/H)	Horry/Brunswick	No Effect	--
Mycteria americana	Wood stork	T	Horry/Brunswick	MA-NLAA	All Detailed Study Alternatives

E – Endangered; T – Threatened; T(S/A) – Threatened due to Similarity of Appearance; T(C/H) – Threatened (Critical Habitat); E(C/H) – Endangered (Critical Habitat); PE – Proposed Endangered; MA-LAA – May Affect, Likely to Adversely Affect; MA-NLAA – May Affect, Not Likely to Adversely Affect

Canby's dropwort

Biological Conclusion: Unresolved

Suitable habitat for Canby's dropwort consists of a variety of coastal plain communities, including pond cypress savannahs, the shallows and edges of cypress/pond pine ponds, sloughs, and wet pine savannas. Surveys for the species will be conducted during the appropriate survey window timeframe (mid-July through September). This species is listed in South Carolina only.

Cooley's meadowrue

Biological Conclusion: No Effect

Suitable habitat for Cooley's meadowrue is present within the study area in the form of wet woodland clearings and power line rights-of-way. No individuals were observed during pedestrian surveys conducted from June 21 to 24, 2021 and June 23, 2022. This species is listed in North Carolina only. A review of NC NHP records on January 23, 2023, indicates no known occurrences within 1.0 mile of the study area. However, additional surveys will be conducted for this species within the parts of the study corridor of CP1 – S2 along Calabash Road to confirm that this species is not present

Finback whale

Biological Conclusion: No Effect

Suitable habitat for finback whale does not exist within the study area as deep, offshore water is not present. This species is listed in South Carolina only. A review of SC NHP records on January 23, 2023, indicates no known occurrences within 2.0 miles of the study area.

Green sea turtle

Biological Conclusion: No Effect

Suitable habitat for green sea turtle does not exist within the study area as waters within the study area are freshwater and do not contain marine grasses. This species is listed in South Carolina and North Carolina. A review of SC NHP records on January 23, 2023, indicates no known occurrences within 2.0 miles of the study area. A review of NC NHP records on January 23, 2023, indicates no known occurrences within 1.0 mile of the study area.

Humpback whale

Biological Conclusion: No Effect

Suitable habitat for humpback whale does not exist within the study area as deep, offshore water is not present. This species is listed in South Carolina only. A review of SC NHP records on January 23, 2023, indicates no known occurrences within 2.0 miles of the study area.

Kemp's Ridley sea turtle

Biological Conclusion: No Effect

Suitable habitat for Kemp's ridley sea turtle does not exist within the study area as beach areas backed by extensive swamps or large bodies of open water are not present. This species is listed in South Carolina and North Carolina. A review of SC NHP records on January 23, 2023, indicates no known

occurrences within 2.0 miles of the study area. A review of NC NHP records on January 23, 2023, indicates no known occurrences within 1.0 mile of the study area.

Leatherback sea turtle

Biological Conclusion: No Effect

Suitable habitat for leatherback sea turtle does not exist within the study area as beaches, bays, estuaries, and large inland bodies of water are not present. This species is listed in South Carolina and North Carolina. A review of SC NHP records on January 23, 2023, indicates no known occurrences within 2.0 miles of the study area. A review of NC NHP records on January 23, 2023, indicates no known occurrences within 1.0 mile of the study area.

Loggerhead sea turtle

Biological Conclusion: No Effect

Suitable habitat for loggerhead sea turtle does not exist within the study area as open-ocean, neritic areas, or coastal beaches are not present. This species is listed in South Carolina and North Carolina. A review of SC NHP records on January 23, 2023, indicates no known occurrences within 2.0 miles of the study area. A review of NC NHP records on January 23, 2023, indicates no known occurrences within 1.0 mile of the study area.

Magnificent ramshorn

Biological Conclusion: No Effect

There is no critical habitat for Magnificent ramshorn within the study area. This species is listed in North Carolina only.

Northern long-eared bat

Biological Conclusion: May Affect, Likely to Adversely Affect

This species is listed in South Carolina and North Carolina. The USFWS has issued a programmatic biological opinion (PBO) in conjunction with FHWA, USACE, and NCDOT for the northern long-eared bat (NLEB) (*Myotis septentrionalis*) in eastern North Carolina. The PBO covers the entire NCDOT program in Divisions 1 through 8, including all NCDOT projects and activities. Although this PBO covers Divisions 1 through 8, the USFWS only considers NLEBs to be known or potentially found in 30 counties within Divisions 1 through 8. NCDOT, FHWA, and USACE have agreed to two conservation measures which will avoid/minimize mortality of NLEBs. These conservation measures only apply to the 30 current known/ potential counties shown on Figure 2 of the PBO at this time. The programmatic determination for NLEB for the NCDOT program is May Affect, Likely to Adversely Affect (MA-LAA). The PBO will ensure compliance with Section 7 of the ESA for ten years (effective through December 31, 2030) for all NCDOT projects with a Federal nexus in Divisions 1 through 8, which includes Brunswick County.

The biological conclusion for NLEB is also May Affect, Likely to Adversely Affect for South Carolina.

Piping plover

Biological Conclusion: No Effect

Suitable habitat for piping plover does not exist within the study area as ocean beaches with little or no vegetation are not present. This species is listed in South Carolina and North Carolina. A review of SC

NHP records on January 23, 2023, indicates no known occurrences within 2.0 miles of the study area. A review of NC NHP records on January 23, 2023, indicates no known occurrences within 1.0 mile of the study area.

Pondberry

Biological Conclusion: Unresolved

Suitable habitat for pondberry consists of pond margins, swampy depressions, sandy sinks, and seasonally flooded wetlands. Surveys for the species will be conducted during the appropriate survey window timeframe (February through March, and September through October). This species is listed in South Carolina only.

Red-cockaded woodpecker

Biological Conclusion: No Effect

Foraging habitat for the Red-cockaded woodpecker (RCW) is present within the study area in the form of mixed pine/hardwood stands, greater than 30 years old. Nesting habitat, in the form of pine dominated mixed pine/hardwood stands 60 years in age or older, is also present within the project study area. Pine dominated stands, both within the study area and within one half mile of the study area boundary, were surveyed on foot, with binoculars, by biologists experienced in identification of the species and their habitat from February 22 to 26, 2021, as well as on March 10 and 15, 2021. Three possible RCW cavity trees were observed. One of the possible cavity trees was located within an overlapping area of the Alternatives 4, 4A, and 7 corridors in South Carolina, and the other two were located within a half-mile, but outside of, the study area within an overlapping area of the Alternatives 2, 7, and 8 corridors in North Carolina. However, no individuals were observed. The exact locations of these possible cavity trees were recorded for the NHP, and the project file was provided to the USFWS. This species is listed in South Carolina and North Carolina. A review of SC NHP records on January 23, 2023, indicates no known occurrence within 2.0 miles of the study area. A review of NC NHP records on January 23, 2023, indicates one known occurrence within 1.0 mile of the study area. As a part of the consultation process in South Carolina, an additional field investigation of cavity trees and associated habitat was conducted on February 25, 2022, with USFWS personnel. The possible cavity tree in South Carolina was determined not to be an RCW cavity tree. According to USFWS representatives, the hole was likely created by a Pileated woodpecker (*Dryocopus pileatus*). After further evaluation, NCDOT also determined that, based on its location, the possible cavity tree in North Carolina was not a concern for the proposed project. Therefore, the Biological Conclusion for this species in South Carolina and North Carolina is No Effect. However, additional surveys will be conducted for this species within the parts of the study corridors of both Construction Phase 1 scenarios along S-111, Mineola Avenue, and Calabash Road to confirm that this species is not present.

Rufa red knot

Biological Conclusion: No Effect

Suitable habitat for rufa red knot does not exist within the study area as ocean beaches or other open sand habitat are not present. This species is listed in South Carolina and North Carolina. A review of SC NHP records on January 23, 2023, indicates no known occurrences within 2.0 miles of the study area. A review of NC NHP records on January 23, 2023, indicates no known occurrences within 1.0 mile of the study area.

Right whale

Biological Conclusion: No Effect

Suitable habitat for right whale does not exist within the study area as Atlantic coastal waters on the continental shelf and offshore deep water are not present. This species is listed in South Carolina only. A review of SC NHP records on January 23, 2023, indicates no known occurrences within 2.0 miles of the study area.

Rough-leaved loosestrife

Biological Conclusion: No Effect

Suitable habitat for rough-leaved loosestrife is present within the study area in the form of wet woodland clearings and utility rights-of-way. No individuals were observed during pedestrian surveys conducted from June 21 to 24, 2021 and June 23, 2022. This species is listed in North Carolina only. A review of NC NHP records on January 23, 2023, indicates no known occurrences within 1.0 mile of the study area. However, additional surveys will be conducted for this species within the parts of the study corridor of CP1 – S2 along Calabash Road to confirm that this species is not present.

Seabeach amaranth

Biological Conclusion: No Effect

Suitable habitat for seabeach amaranth is not present within the study area as barrier island beaches, lower foredunes, and upper strands of noneroding beaches (landward of the wrack line) are not present. This species is listed in South Carolina and North Carolina. A review of SC NHP records on January 23, 2023, indicates no known occurrences within 2.0 miles of the study area. A review of NC NHP records on January 23, 2023, indicates no known occurrences within 1.0 mile of the study area.

Sei whale

Biological Conclusion: No Effect

Suitable habitat for sei whale does not exist within the study area as deeper water from the coastline is not present. This species is listed in South Carolina only. A review of SC NHP records on January 23, 2023, indicates no known occurrences within 2.0 miles of the study area.

Shortnose sturgeon

Biological Conclusion: No Effect

Suitable habitat for shortnose sturgeon does not exist within the study area as estuarine and riverine habitat of larger river systems are not present. This species is listed in South Carolina only. A review of SC NHP records on January 23, 2023, indicates known occurrences within 2.0 miles of the study area.

Sperm whale

Biological Conclusion: No Effect

Suitable habitat for sperm whale does not exist within the study area as oceans and deep-water habitat are not present. This species is listed in South Carolina only. A review of SC NHP records on January 23, 2023, indicates no known occurrences within 2.0 miles of the study area.

Tricolored bat

Biological Conclusion: May Affect, Likely to Adversely Affect (NC); Unresolved (SC)

This species is listed in South Carolina and North Carolina. The USFWS has issued a programmatic conference opinion (PCO) in conjunction with FHWA, USACE, and NCDOT for the tricolored bat (TCB) (*Perimyotis subflavus*) in eastern North Carolina. The PCO covers the entire NCDOT program in Divisions 1 through 8, including all NCDOT projects and activities. NCDOT, FHWA, and USACE have agreed to three conservation measures (listed in the PCO) which will avoid/minimize take to TCBs. These conservation measures apply to all counties in Divisions 1 through 8. The programmatic determination for TCB for the NCDOT program is May Affect, Likely to Adversely Affect. Once the TCB is officially listed, the PCO will become the PBO by formal request from FHWA and USACE. The PBO will ensure compliance with Section 7 of the ESA for approximately five years (effective through December 31, 2028) for all NCDOT projects with a Federal nexus in Divisions 1 through 8, which includes Brunswick County, where R-5876 is located.

Suitable habitat for tricolored bats generally consists of forested landscapes, often in open woods and adjacent to water edges. In South Carolina, foraging habitat generally consists of sparse vegetation and early successional stands. SCDOT will pursue consultation with the USFWS to determine the potential effects of this project for tri-colored bat in Horry County. The biological conclusion is Unresolved for South Carolina.

West Indian manatee

Biological Conclusion: No Effect

Suitable habitat for West Indian manatee does not exist within the study area as large streams, sluggish rivers, and estuarine habitat are not present. This species is listed in South Carolina and North Carolina. A review of SC NHP records on January 23, 2023, indicates known occurrences within 2.0 miles of the study area, last observed in 2020. A review of NC NHP records on January 23, 2023, indicates no known occurrences within 1.0 mile of the study area.

Wood stork

Biological Conclusion: May Affect, Not Likely to Adversely Affect

Suitable habitat for the wood stork is present within the study area in the form of wetlands, swamps, and canals. During field surveys conducted on March 15 and April 20 to 21, 2021, two individuals were observed in North Carolina: one flying within the Alternative 7 corridor and one outside, but within a half-mile, of the study area. No colonies were observed. The exact locations were recorded for the NC NHP and the project file. This species is listed in South Carolina and North Carolina. A review of SC NHP records on January 23, 2023, indicates no known occurrences within 2.0 miles of the study area. A review of NC NHP records on January 23, 2023, indicates no known occurrences within 1.0 mile of the study area.

4.6.4.4 Bald Eagle and Golden Eagle Protection Act

As discussed in Section 3.6.4.4, foraging habitat for bald eagle is present within the study area. Since there is foraging habitat within the review area, a survey of the project study area and the area within 660 feet of the project limits was conducted on March 15, April 20 to 21, and June 21 to 24, 2021. No bald eagles were observed during these surveys. Additionally, a review of the NC NHP database on January 23, 2023, 2021, revealed no known occurrences of this species within 1.0 mile of the project

study area. A review of SC NHP records on January 23, 2023, indicates no known occurrences within 2.0 miles of the study area. Due to the lack of known occurrences, no observations of eagles during field surveys, and minimal impact anticipated for this project, it has been determined that this project will not affect this species.

4.6.4.5 Migratory Birds Impacts

This section addresses potential impacts to migratory birds as required under the Migratory Bird Treaty Act (MBTA) and E.O. 13186, which directs federal agencies to minimize adverse impacts on migratory birds. The migratory birds potentially present in the study area are listed in Table 3-15 in Chapter 3.

4.6.4.5.1 Potential Impacts

The proposed project involves construction activities that could lead to habitat loss, fragmentation, and disturbance of nesting or foraging behaviors. These impacts may disproportionately affect Birds of Conservation Concern (BCC) species due to their conservation status and specific habitat requirements. Key risks include vegetation clearing, which may remove nesting and foraging habitats; increased noise and activity, potentially displacing birds during critical breeding seasons; and the heightened risk of collisions between birds and construction equipment or new structures.

4.6.4.5.2 Mitigation Measures

Proposed mitigation measures based on USFWS's *Nationwide Standard Conservation Measures* will address these impacts. Timing restrictions may be considered to prevent vegetation clearing or disruptive activities during peak breeding seasons. Efforts will be made to minimize habitat disturbance by retaining existing vegetation where feasible, as well by minimizing project creep by clearly delineating and maintaining project boundaries (including staging areas). Construction activities could potentially be limited to daylight hours to mitigate disturbance. Bird-friendly designs, such as visibility markers on structures, could be implemented to reduce collision risks.

4.6.4.5.3 Compliance and Coordination

This assessment and mitigation strategy align with the MBTA and E.O. 13186 requirements. Coordination with USFWS will ensure the effectiveness of these measures, and adaptive management will be applied as necessary. The implementation of these strategies will minimize adverse impacts on migratory birds, particularly BCC species, within the study area.

4.6.4.6 Essential Fish Habitat Impacts

As discussed in Section 3.6.4.6, there is no designated Essential Fish Habitat present within the study area.

4.6.4.7 Areas of Environmental Concern Impacts

As discussed in Section 3.6.4.7, NC Coastal Area Management Act (CAMA) Areas of Environmental Concern (AEC) were identified in the Brunswick County portion of the study area. The open waters of Cawcaw Swamp and Shingletree Swamp at major hydraulic site 21, as well as the open waters of Shingletree Swamp at major hydraulic site 23, are designated as NC CAMA Public Trust Waters (PTW) AEC. In addition, the first 30 feet of ground along both sides of the normal high water lines of these NC CAMA PTWs are classified as NC CAMA Coastal Shoreline AEC and buffer.

An additional AEC may be present where CP1 – S2 crosses Shingletree Swamp on Hickman Road. The existing hydraulic structure is a triple-barrel, ten-foot by eight-foot RCBC that carries Shingletree Swamp beneath Hickman Road. Under CP1 – S2, this existing RCBC (designated as major hydraulic site 67, see Figure 14) would be retained and extended to accommodate the widened eight-foot shoulders (two-foot paved) along Hickman Road. Since the previous identification of portions of Shingletree Swamp as AECs was made in the field as part of the CP 2A NEPA/Section 404 Merger Team meeting, the NCDCM would need to confirm if the portion of Shingletree Swamp crossed by CP1 – S2 is an AEC.

As shown on Figure 24, Alternatives 1, 1A, 4, and 4A would cross the NC CAMA AECs along Cawcaw Swamp and Shingletree Swamp at major hydraulic site 21, and Alternative 2 would cross the NC CAMA AECs along Shingletree Swamp at site 23. However, there are not expected to be any permanent impacts to the NC CAMA AECs at either of these sites because the bridges for all of the Detailed Study Alternatives would be designed to completely span (extend) over the top of the NC CAMA AECs without touching them. No fill material or bridge piles would be placed within the NC CAMA AECs. It is expected that there will be clearing impacts to the NC CAMA AECs at the bridge crossings, as well as temporary impacts during construction, so an NC CAMA Major Permit from the North Carolina Division of Coastal Management (NCDCM) would be required for the Detailed Study Alternatives that cross these sites. An NC CAMA consistency determination from NCDCM would be required for the other Detailed Study Alternatives that do not cross major hydraulic sites 21 and 23. If the portion of Shingletree Swamp at major hydraulic site 67 that is crossed by CP1 – S2 is confirmed as an AEC, the proposed impacts of extending the existing RCBC would also be subject to stipulations developed under an NC CAMA Major Permit from the NCDCM.

4.6.4.8 Anadromous Fish Habitat Impacts

As discussed in Section 3.6.4.8, there is no anadromous fish habitat present within the study area.

4.6.4.9 Submerged Aquatic Vegetation Impacts

As discussed in Section 3.6.4.9, there is no submerged aquatic vegetation present within the study area.

4.7 Construction Impacts for Detailed Study Alternatives

Construction of any of the Detailed Study Alternatives is expected to result in similar temporary impacts as described below. Examples of construction activities include clearing and grubbing, maintenance of traffic, bridge construction, utility relocations, traffic signal construction, and roadway paving. Typical types of negative impacts from construction would include noise from construction equipment, driver time delays at existing road crossings, and dust from construction sites.

Since construction operations would be limited to the time needed to complete the project, both benefits and impacts to resources would be considered temporary. Utilization of NCDOT and SCDOT standards and specifications would ensure that these impacts are minimized.

4.7.1 Energy

A substantial amount of energy will be required to construct any of the Detailed Study Alternatives. However, the energy use will be temporary and should ultimately result in energy use reductions upon project completion, due to reduced congestion and increased operational safety within the study area.

Because of congestion reductions and increased safety, construction of any of the Detailed Study Alternatives is expected to result in less total energy utilization than the No-Build Alternative.

E.O.s 13212 and 13302 require Federal agencies to take actions to expedite projects which will increase the production, transmission, or conservation of energy, or which strengthen pipeline safety. The subject project is not energy-related, therefore E.O.s 13212 and 13302 do not apply.

4.7.2 Lighting

Because construction activities could occur 24 hours a day, construction areas could be lit to daylight conditions at night. Night lighting would not be used near residential areas.

4.7.3 Visual

Temporary visual impacts would affect properties adjacent to areas where construction, staging, and stockpiling operations occur. Upon project completion, the contractor would be required to remove all equipment and excess materials, as well as reseed any disturbed areas.

4.7.4 Construction Noise

Construction noise varies greatly with the type of equipment in use and the phase of construction activity. Noise levels near a construction project therefore fluctuate greatly from day to day and hour to hour. Construction noise sources include truck and equipment engines, equipment noise from clearing and excavation, back-up alarms, and truck tailgates. Noise generated by construction equipment can reach noise levels of 67 dBA to 98 dBA at a distance of 50 feet. Noise impacts, such as temporary speech interference for passers-by and those individuals living or working near the project, can be expected during construction of any of the Detailed Study Alternatives.

Construction noise impacts may occur if noise-sensitive receptors are in proximity to project construction activities. All reasonable efforts will be made to minimize exposure of noise sensitive areas to construction noise impacts. To minimize construction noise in South Carolina, the contractor will be required to comply with the SCDOT *2007 Standard Specifications for Highway Construction*, which includes specifications regarding nuisance noise avoidance. In North Carolina, NCDOT specifications require the contractor to limit noise levels to 80 dBA Leq in noise sensitive areas adjacent to the project. NCDOT and SCDOT may also monitor construction noise and require abatement measures where limits are exceeded. NCDOT and SCDOT also can limit work that produces objectionable noise during normal sleeping hours.

4.7.5 Air

During construction of the proposed project with all of the Detailed Study Alternatives all materials resulting from clearing and grubbing, demolition, or other operations will be removed from the project, burned, or otherwise disposed of by the contractor. Any burning will be performed in accordance with applicable local laws and ordinances, as well as the regulations of the South Carolina State Implementation Plan (SIP) for air quality, or the North Carolina SIP (in compliance with 15 NCAC 2D.1900), as appropriate. Care will be taken to ensure burning will be performed at the greatest distance practical from dwellings and not when atmospheric conditions are such as to create a hazard to the public. Burning will be performed under constant surveillance. Also during construction, measures

will be taken to reduce the dust generated by construction when the control of dust is necessary for the protection and comfort of motorists or area residents. Emissions from construction equipment are regulated.

Air quality impacts resulting from roadway construction activities are typically not a concern when contractors use appropriate control measures. Contractors shall perform all construction activities with adequate control measures in place (e.g., watering exposed surfaces, covering or maintaining free board space on haul trucks, limiting vehicle speeds on unpaved roads, and minimizing equipment idling time). The temporary air quality impacts from construction are not expected to be significant.

4.7.6 Utilities

Construction of the proposed project with all of the Detailed Study Alternatives will require some adjustment, relocation, or modification to existing utilities. Any disruption to utility service during construction will be minimized by close coordination with utility providers and property owners in affected areas, as well as phased adjustments to utilities.

4.7.7 Water Quality and Erosion Control

Erosion and sedimentation caused by construction activities with all of the Detailed Study Alternatives could affect drainage patterns and water quality. Erosion and sedimentation during project construction will be controlled through the specification, installation, and maintenance of stringent erosion and sedimentation control methods. In South Carolina, in accordance with the South Carolina Pollution Control Act and the Federal Clean Water Act, the contractor would be required to implement construction best management practices reflecting policies contained in 23 CFR 650B (Erosion and Sediment Control on Highway Construction Projects) and SCDOT's latest edition of *Supplemental Specifications on Seeding and Erosion Control Measures*. In North Carolina, in accordance with the North Carolina Sedimentation Pollution Control Act (15A NCAC 4B.001-.0027), an erosion and sedimentation control plan will be prepared for the Selected Alternative. The plan will follow guidelines established in the North Carolina Department of Environmental Quality publication *Erosion and Sediment Control Planning and Design* and NCDOT's *Best Management Practices for Protection of Surface Waters*.

Impacts resulting from erosion and sedimentation will be kept to a minimum by employing Best Management Practices such as revegetating or covering disturbed areas and the use of berms, dikes, silt barriers, and catch basins.

SCDOT and NCDOT both have Standard Specifications and construction best management practices that require proper handling and use of construction material. The contractor will be responsible for taking precautions during construction to prevent the pollution of water bodies. These precautions include, but are not limited to the following:

- Pollutants such as chemicals, fuels, lubricants, raw sewage, bitumens, and other harmful wastes shall not be discharged into any body of water.
- Contractors may not ride or drive mechanical equipment across streams unless construction is required in the streambed.

- Excavated materials must be stored and disposed in a way that prevents erosion of the material into surface waters. If material storage in these areas cannot be avoided, best management practices must be implemented to avoid runoff.

4.7.8 Geodetic Survey Markers

Geodetic survey markers within the study area would be properly relocated if affected by any of the Detailed Study Alternatives.

4.7.9 Borrow and Disposal Sites

Construction of the new location roadway and bridges, as well as improvements to existing roads, may require excavation of unsuitable material and placement of embankments. The estimated amount of borrow and/or waste associated with the construction of the proposed project is calculated during the final design phase. During the construction phase of the project, the contractor uses this information to determine the specific borrow and/or disposal sources and sites needed to meet the project's mineral (i.e., sand, gravel, etc.) needs. The contractor may acquire borrow materials from appropriately permitted, commercially operated borrow pits, or from borrow pits located and established by the contractor with appropriate permits, including permits for borrow and waste activities that impacts Waters of the United States.

The siting of borrow pits and completion of all necessary environmental reviews for them will be addressed by the contractor at a later date. However, NCDOT's *Standard Specifications for Roads and Structures* (January 2018) include requirements that the contractor must adhere to during project construction with respect to addressing potential human and natural environment impacts due to borrow excavation at proposed borrow sources, as well as due to the disposal of waste and debris. SCDOT also has requirements that the contractor must follow with respect to potential impacts due to borrow pits established by the contractor. As previously discussed, NCDOT and SCDOT also both have construction best management practices that the contractor will follow to limit potential impacts with respect to the establishment of borrow sites and the disposal of waste, in particular with respect to avoidance and minimization of erosion and the runoff of sediments. All construction waste material generated during clearing, grubbing, and other construction phases will be disposed of by the contractor, either on-site in retention areas or off-site, in accordance with the applicable South Carolina or North Carolina state and local regulations. Borrow material from sources in any area under the jurisdiction of the USACE and the placement of waste materials in wetlands or streams will not be allowed unless NCDOT or SCDOT, as appropriate, has obtained a permit for those activities from the USACE.

4.7.10 Traffic Maintenance and Detour Accessibility

Detours and road closures may be required in locations where the proposed project with all of the Detailed Study Alternatives uses or crosses existing roadways. Maintenance of traffic and construction sequencing will be planned and scheduled to minimize traffic delays within the project limits. Temporary lane closures and detours may be required at times during construction. A traffic control plan will be prepared during the final design phase of the project, which will detail impacts to existing traffic patterns, as well as road closures or realignments. The plan will also define detour routes, designated truck routes, and parking areas for construction equipment. Signs will be used where appropriate to

provide notice of road closures and other pertinent information to the traveling public. Access to all businesses and residences will be maintained to the extent practical during construction.

4.7.11 Bridge Demolition

All of the Detailed Study Alternatives will require the removal of the existing bridge carrying the SC 31 entrance/exit ramps over SC 9. The construction contractor will be responsible for disposal of materials produced by the removal of the SC 31 bridge. The bridge will be inspected prior to demolition to determine the presence of hazardous materials such as lead paint and asbestos. As necessary, hazardous material procedures required by SCDHEC and by state and Federal regulations will be followed. Disposal of hazardous materials will occur only at a permitted hazardous waste disposal site. Non-hazardous materials will be recycled and/or transported for disposal at a permitted non-hazardous disposal site. It is not expected that any materials from existing structures will be dropped into Waters of the United States during project construction.

The Migratory Bird Treaty Act (MBTA) of 1918 is intended to ensure the sustainability of populations of all protected migratory bird species. It prohibits the take (including killing, capturing, selling, trading, and transport) of protected migratory bird species without prior authorization by the USFWS. In accordance with the MBTA, the existing SC 31 bridge will be inspected for evidence of swallow nesting and, if found, bridge demolition will occur outside of the swallow breeding season (i.e., Spring to Summer).

4.8 Irretrievable and Irreversible Commitment of Resources for Detailed Study Alternatives

Implementation of any of the Detailed Study Alternatives would involve a commitment of a range of natural, physical, human, and fiscal resources. Land used for the construction of the proposed project is considered an irreversible commitment during the time period that the land is used for a highway facility. However, if a greater need arises for the use of the land or if the highway facility is no longer needed, the land can be converted to another use. At present, there is no reason to believe such a conversion will be necessary or desirable.

Considerable amounts of fossil fuels, labor, and highway construction materials, such as concrete, aggregate, and bituminous material, would be expended to build the proposed project. Additionally, large amounts of labor and natural resources would be used in the fabrication and preparation of construction materials. These materials are generally not retrievable. However, they are not in short supply and their use will not have an adverse effect upon continued availability of these resources. Any construction in either North Carolina or South Carolina also would require a substantial one-time expenditure of state funds, which are not retrievable.

The commitment of these resources is based on the concept that residents in the immediate area, region, and both states will benefit from the improved quality of the transportation system.

4.9 Relationship between Long Term and Short Term Uses/Benefits for Detailed Study Alternatives

The most disruptive short-term impacts associated with all of the Detailed Study Alternatives for the proposed project would occur during land acquisition and project construction in both North Carolina and South Carolina. However, these short-term uses of human, physical, economic, cultural, and natural resources would contribute to the long-term productivity of the study area.

Existing homes and businesses within the Selected Alternative's right-of-way will be displaced. However, adequate replacement housing, land and space are available for homeowners and business owners to relocate within the study area in both states.

All of the Detailed Study Alternatives are consistent with the objectives of state and local transportation plans in both North Carolina and South Carolina. It is anticipated that the proposed project will enhance long-term access and connectivity opportunities in both Horry County and Brunswick County and will support local, regional, and statewide commitments to transportation improvement and economic viability in both states.

5.0 Agency Coordination and Public Involvement

This chapter identifies the public involvement and environmental resource and regulatory agency coordination that is integral to the project development and decision-making process.

As a result of Executive Order (E.O.) 14148, E.O. 14154, E.O. 14173, and the removal of the Council on Environmental Quality's regulations, all federal environmental justice requirements are revoked and no longer applicable to the federal environmental review process. Accordingly, this Draft Environmental Impact Statement (DEIS) does not consider public comments regarding environmental justice.

5.1 Agency Coordination

This project was coordinated with the appropriate Federal, state, and local agencies. Comments and concerns received throughout the project development process were incorporated into this document.

5.1.1 NEPA/Section 404 Merger Process

This project has followed North Carolina's NEPA/Section 404 Merger Process, adapted to include South Carolina regulatory and resource agencies as team members. The merger process is an interagency procedure integrating the regulatory requirements of Section 404 of the Clean Water Act into the National Environmental Policy Act and North Carolina State Environmental Policy Act decision-making process. The agencies represented on the NCDOT Statewide Transportation Improvement Program (STIP) Project R-5876 and SCDOT Project P029554 NEPA/Section 404 Merger Team are:

- US Army Corps of Engineers (Charleston District and Wilmington District)
- US Environmental Protection Agency (North Carolina and South Carolina)
- US Fish and Wildlife Service (Raleigh, NC and Charleston, SC)
- Federal Highway Administration (FHWA)
- National Marine Fisheries Service
- NC Department of Cultural Resources – State Historic Preservation Office
- NC Department of Transportation
- NC Division of Coastal Management (NCDCM)
- NC Division of Water Resources (NCDWR)
- NC Wildlife Resources Commission (NCWRC)
- SC Department of Archives and History – State Historic Preservation Office
- SC Department of Health and Environmental Control (DHEC)
- SCDHEC – Ocean and Coastal Resource Management
- SCDHEC – Bureau of Water
- SC Department of Natural Resources
- SC Department of Transportation
- Cape Fear Rural Transportation Planning Organization
- GSATS Metropolitan Planning Organization
- Horry County – Ride 3

The following is a summary of the Merger Team meetings that have taken place to date for the proposed Carolina Bays Parkway Extension:

- The Concurrence Point 1 (Purpose and Need and Study Area Defined) meeting was held on March 19, 2019. The purpose of the meeting was to review information about the project's purpose and need and preliminary study area. Following discussion, the Merger Team concurred on Concurrence Point 1 (CP 1), and a copy of the signed concurrence form is included in Appendix B.
- The Alternatives Screening meeting was held on September 30, 2019. The Alternatives Screening meeting is an interim step between CP 1 and CP 2 (Detailed Study Alternatives Carried Forward). The purpose of the meeting was to review preliminary corridor concepts for the proposed Carolina Bays Parkway Extension and determine which alternatives and concepts should be carried forward to public meetings for the project held later in 2019. As part of the Alternatives Screening meeting, the Merger Team could drop alternatives, add alternatives, or combine corridor segments if desired. Information gathered at the Alternatives Screening meeting would be used to revise the suite of alternatives and concepts presented to the public and to inform the CP 2 meeting following the public meetings. It was discussed that the preliminary alternatives include the No Build Alternative, the Transportation Systems Management (TSM) Alternative, the Travel Demand Management (TDM) Alternative, the Mass Transit Alternative, and a Build Alternative comprised of nine Build Concepts that were developed using a "least-cost," or "best-path," methodology. The meeting handout included a table titled "Preliminary Corridor Alternative Concepts – Potential Environmental Effects" which summarized the potential natural resource, human environment, and physical environment impacts of the nine Build Concepts based on the best available or modeled information available at that time for the corridors. Following detailed discussion of the potential impacts, the Merger Team agreed that all nine corridor concepts as presented at the Alternatives Screening meeting would be presented for public review and input at the public meetings held in late 2019.
- The Concurrence Point 2 (Detailed Study Alternatives Carried Forward) meeting was held on May 4, 2020 following public meetings. The purpose of the meeting was to discuss and reach formal concurrence with Merger Team members on the alternatives to carry forward for detailed study in the DEIS for the Carolina Bays Parkway Extension project. As a result of a proposal from Sunset Beach and associated public comments following the public meetings in 2019, the project team explored three options to best address the request to increase the length of proposed Carolina Bays Parkway Extension on new location in North Carolina inland from US 17, minimize impacts to both the human and natural environment, and meet the purpose and need. The resultant alignment creates alternates to each of Concepts 1 and 4 that are identified as Concept 1A and Concept 4A. The Merger Team agreed to expand the project study area to allow consideration of alignments suggested during the public input process for alternatives that could achieve the project's purpose and satisfy specific transportation needs while minimizing potential impacts to important environmental features. Following detailed discussion of the potential impacts of the eleven Build alternatives to the natural, human, and physical environments, as well as the public input received at the public meetings, the Merger Team agreed to retain Alternatives 1, 1A, 2, 4, 4A, 7, and 8 for detailed study in the DEIS. It was also agreed to eliminate Alternatives 3, 5, 6, and 9 from further study. Based on recommendations from the NCDOT and SCDOT, the Merger Team also agreed to eliminate the No Build, TSM, TDM, and Mass Transit alternatives as viable alternatives to accomplish the purpose of the project. A copy of the signed CP 2 concurrence form is included in Appendix B.
    - The two Construction Phase 1 scenarios (CP1 – S1 and CP1 – S2) were not under consideration at the time of the Concurrence Point 2 meeting and have not yet been reviewed by the Merger Team. Additional coordination with the Merger Team will be required.

- The Concurrence Point 2A (Bridging Decisions and Alignment Review) meeting was held on September 30, 2021 via teleconference. The purpose of the meeting was to review the seven Detailed Study Alternatives for the proposed project and reach concurrence on major hydraulic structure recommendations and alignment, or to identify major hydraulic crossing sites that need further review at subsequent field meetings before deciding on the structure type and size. Map figures and tables were presented to provide an overview of recommendations for functional roadway designs, major hydraulic structures (i.e., 72 inches or greater in diameter), and preliminary project impacts. It was discussed that there are a total of 42 proposed major hydraulic sites among the seven Detailed Study Alternatives, but to streamline discussion, the meeting presentation would focus on the 17 largest hydraulic structure sites (i.e., double barrel culverts and larger). However, information on the 25 additional major hydraulic sites was provided in the meeting handout for discussion at the meeting, if requested. Each site discussed was shown on a Google Earth KMZ map of the Detailed Study Alternatives that was presented at the meeting. It was noted that all of the proposed hydraulic structure sizes were preliminary pending discussions with the Merger Team. The Merger Team requested that the meeting handout be updated with cost comparison information between bridges and culverts for sites in North Carolina prior to the field review meeting. Wetland and stream mitigation costs were also requested to be included in the cost comparisons, as appropriate. The Merger Team did not request a field review meeting for hydraulic crossing sites in South Carolina, but a field review meeting was conducted on October 7, 2021 for several sites in North Carolina.

  Several changes to the major hydraulic structure recommendations were requested by the Merger Team following the CP 2A Meeting and subsequent field review. In addition, all major hydraulic structures presented at the CP 2A Meeting were designed to accommodate the 50-year rainfall event, as has historically been standard practice for primary routes in both North Carolina and South Carolina. However, following subsequent discussion with NCDOT and SCDOT, the project team determined hydraulic structures for the proposed project will instead be designed to accommodate the 100-year rainfall event to allow the roadway to recover more quickly from intense rainfall events. It is not anticipated these changes will result in substantial changes in jurisdictional resource impacts or mitigation costs. A revised table showing the updated recommended hydraulic structures was provided to the Merger Team prior to requesting formal concurrence on CP 2A. The Merger Team concurred on the minimum hydraulic structure recommendations to be analyzed as part of the Detailed Study Alternatives for the proposed project, and a copy of the signed CP 2A concurrence form is included in Appendix B.

  - The two Construction Phase 1 scenarios were not under consideration at the time of the Concurrence Point 2A meeting. Major hydraulic site 67 is unique to CP1 – S2 and has therefore not yet been reviewed by the Merger Team. Additional coordination with the Merger Team will be required.

The Concurrence Point 3 (LEDPA/Preferred Alternative Selection) meeting to select the Applicant's Preferred/Least Environmentally Damaging Practicable Alternative (LEDPA) corridor for the proposed Carolina Bays Parkway Extension will be held following the public hearing. The Concurrence Point 4A (Avoidance and Minimization) meeting to discuss further avoidance and minimization measures to optimize the design and benefits of the project while reducing environmental impacts to both the human and natural environment will be held following the selection of the Applicant's Preferred/LEDPA corridor.

5.1.2 Other Agency Coordination

An internal project scoping meeting was held on December 14, 2016 to exchange information about the proposed project. Representatives from NCDOT, SCDOT, and GSATS attended the meeting.

A Local Official's Informational Meeting was held on February 7, 2017. The purposes of the meeting were to: provide an opportunity for information exchange with local officials; present information on the project background and purpose; and discuss the project status and proposed schedule. Thirty-eight (38) attendees signed in at the meeting, including 22 representatives from local jurisdictions, and five property owners and/or HOA representatives. The following local jurisdictions and agencies were represented at the meeting:

- Brunswick County, North Carolina
- Town of Calabash, North Carolina
- Town of Carolina Shores, North Carolina
- Town of Holden Beach, North Carolina
- Town of Ocean Isle Beach, North Carolina
- Town of Shallotte, North Carolina
- Town of Sunset Beach, North Carolina
- Town of Varnamtown, North Carolina
- Horry County, South Carolina
- City of Myrtle Beach, South Carolina
- City of North Myrtle Beach, South Carolina
- GSATS Metropolitan Planning Organization
- NCDOT
- SCDOT

Several attendees requested that consideration be given to expanding the preliminary study area boundary to the north from the Carolina Shores area to the eastern terminus of the proposed project. These attendees believed an expanded study area would make it possible to develop corridor alignments further to the north that traverse undeveloped land rather than impacting developed portions of Carolina Shores and the surrounding area. It was also discussed that a group of property owners hired an engineering firm to develop conceptual routes for the project that would have the most positive economic impact for the area. The conceptual routes would be located in less developed areas with less existing community and tax base impacts. The property owners also believe the routes being developed would also help the economy of areas that are currently undeveloped by opening these areas up to potential development and related economic activity. It was pointed out that the development of preliminary alternatives will require seeking a balance between potential impacts to developed areas and wetlands. NCDOT and SCDOT representatives indicated they are receptive to receiving input from citizens groups on potential corridors and alignments at the appropriate stage of project development, but the current focus is on developing the purpose and need for the project. In addition, any such discussions with citizens groups will need to be integrated into the normal project development process.

A project scoping letter announcing the start of the proposed Carolina Bays Parkway Extension project development, environmental and engineering studies was mailed out to Federal, state, and local agencies in August 2017. Comments on the project were requested from the agencies listed below. An

asterisk (*) next to the agency name indicates that a written response was received in response to the scoping letter. Copies of this and other agency correspondence are included in Appendix B.

US Coast Guard
US Department of the Army – Corps of Engineers, Charleston District
US Department of the Army – Corps of Engineers, Wilmington District
US Environmental Protection Agency – North Carolina
US Environmental Protection Agency – South Carolina
* US Department of the Interior – US Fish and Wildlife Service, Raleigh, NC
* US Department of the Interior – US Fish and Wildlife Service, Charleston, SC
US Department of Housing and Urban Development, Columbia Field Office
* National Oceanic and Atmospheric Administration – National Marine Fisheries Service
Federal Highway Administration, North Carolina Division
Federal Highway Administration, South Carolina Division
* NC Department of Cultural Resources – State Historic Preservation Office
* NC Division of Coastal Management
* NC Division of Water Resources
NC Wildlife Resources Commission
SC Budget and Control Board
SC Department of Archives and History – State Historic Preservation Office
SC Department of Agriculture
SC Department of Health and Environmental Control (DHEC)
SCDHEC – Bureau of Air Quality
SCDHEC – Bureau of Environmental Services
SCDHEC – Bureau of Land and Waste Management
* SCDHEC – Bureau of Water
* SCDHEC – Ocean and Coastal Resource Management
* SC Department of Natural Resources
SC Department of Parks, Recreation and Tourism
SC Forestry Commission
SC Institute for Archeology and Anthropology
SC Wildlife Federation
* Brunswick County, North Carolina
Cape Fear Council of Governments
Cape Fear Rural Transportation Planning Organization
* Catawba Indian Nation
Coast RTA
Eastern Band of Cherokee Indians
GSATS Metropolitan Planning Organization
Horry County, South Carolina
United Keetoowah Band of Cherokee
* Town of Calabash, North Carolina
* Town of Carolina Shores, North Carolina
* Town of Ocean Isle Beach, North Carolina
* Town of Shallotte, North Carolina
* Town of Sunset Beach, North Carolina
Coastal Conservation League
National Wild Turkey Foundation

Ridge Heritage Association
Sierra Club
The Nature Conservancy

An External Scoping Meeting was held on October 19, 2017. The purpose of the meeting was to gather information for use in Carolina Bays Parkway Extension project development. Meeting attendees were provided a handout showing project background information and mapping. Representatives from the following agencies attended the meeting:

- US Army Corps of Engineers, Charleston District
- US Army Corps of Engineers, Wilmington District
- US Fish and Wildlife Service, Raleigh Field Office
- National Marine Fisheries Service
- Federal Highway Administration, North Carolina Division
- NC Department of Cultural Resources – State Historic Preservation Office
- NC Department of Transportation
- NC Division of Coastal Management
- NC Division of Water Resources
- NC Wildlife Resources Commission
- SC Department of Health and Environmental Control
- SC Department of Natural Resources
- SC Department of Transportation
- Cape Fear Rural Transportation Planning Organization
- GSATS Metropolitan Planning Organization
- Horry County – Ride 3

NCDOT and SCDOT conducted a meeting with the GSATS Metropolitan Planning Organization Transportation Advisory Committee (TAC) on July 20, 2018. The purpose of the meeting was to provide an update on the status of the proposed project, including the preliminary study area, project purpose and need, preliminary cost estimates, project schedule, and next steps in project development. Meeting participants also had an opportunity to ask questions and provide feedback to the project team.

NCDOT and SCDOT conducted a project status update meeting with the GSATS Metropolitan Planning Organization Policy Committee on November 15, 2019 in advance of the December 3 and 4, 2019 open house public meetings (see Section 5.2.2). The purpose of the meeting was to provide the local elected officials serving on the Policy Committee an opportunity to review project-related information, including the preliminary cost estimates, the project purpose and need, the corridor concepts development process, the nine preliminary corridor concepts, the potential environmental effects, and the overall project development status and next steps, prior to the public meetings. Meeting participants also had an opportunity to ask questions, provide comments, and discuss various aspects of the proposed project with the project team.

NCDOT and SCDOT also conducted a project status update meeting with south Brunswick County mayors on December 2, 2019 in advance of the December 3 and 4, 2019 open house public meetings. The purpose of the meeting was to provide local elected officials outside the GSATS MPO area an opportunity to review project-related information, including figures showing the nine preliminary corridor concepts, a table showing the potential environmental effects, preliminary cost estimates, and

the overall project development status, prior to the public meetings. Meeting participants also had an opportunity to ask questions, provide comments, and discuss various aspects of the proposed project with the project team. The majority of the comments received at the meeting were related to concerns about impacts to Indigo Farms.

5.2 Public Involvement

5.2.1 Notice of Intent

The original Notice of Intent (NOI) for the preparation of a DEIS for the proposed Carolina Bays Parkway Extension was published in the Federal Register by the US Army Corps of Engineers (USACE) on July 6, 2017.

On November 30, 2018, USACE rescinded the original NOI for the proposed Carolina Bays Parkway Extension after NCDOT decided to use Federal funds for the project. USACE issued a Notice in the Federal Register to withdraw the prior NOI, and to notify the public that it would no longer be the lead Federal agency, and would not be issuing a DEIS for the proposed project. USACE indicated in the Notice that the project will be Federally-funded and another lead agency would issue a NOI to prepare a DEIS. FHWA subsequently notified all Federal, tribal, state, and local agencies on the NEPA/Section 404 Merger Team, as well as the general public, that it would assume the lead Federal agency role.

FHWA subsequently published a NOI for the preparation of a DEIS for the proposed Carolina Bays Parkway Extension in the Federal Register on October 7, 2021. A Supplementary NOI for the proposed project was also published by FHWA at the same time. The Supplementary NOI contained additional details on the proposed project for public review to assist with preparation of comments or questions, including: purpose and need; preliminary alternatives; anticipated impacts; anticipated permits and authorizations; scoping process; request for input and contact information; permitting timetable; and figures showing the project study area, preliminary corridor concepts, and detailed study alternatives. Copies of the NOI and Supplementary NOI are included in Appendix B.

5.2.2 Open House Public Meetings

5.2.2.1 Citizen Comments

Open house public meetings were held on December 3, 2019 in Sunset Beach, NC and on December 4, 2019 in Little River, SC. Citizens received notification about the public meetings through the mail via postcards sent to study area residents, as well as through legal ads posted in local newspapers and online at NCDOT and SCDOT websites. The informal public meetings gave the public the opportunity to view project maps and the nine corridor concepts, review the project schedule and cost estimate, ask questions, provide comments, and discuss various aspects of the project with the project team. Online versions of the meetings were hosted through PublicInput.com, which gave users an opportunity to review the same information provided during the meeting, complete a poll to rank the nine corridor concepts in order of preference, and leave comments. A total of 553 individuals signed-in to the North Carolina meeting, and 467 individuals signed-in to the South Carolina meeting. A total of 1,804 public comments on the proposed project were received. The majority of public comments were submitted electronically via PublicInput.com online forms (1,394) and emails (206), whereas 115 comment sheets

were completed at the workshops. A petition regarding the preservation of Indigo Farms with 270 typed names and 22 additional comments was also received.

The majority of public comments and questions received related to corridor concept preferences (768), project impacts (576), and alternative corridor concepts (420). Approximately 628 comments were received in support of an alternative corridor concept proposed by the Town of Sunset Beach (see Section 5.2.2.2). The results of the poll on PublicInput.com allowing commenters to rank the nine corridor concepts in order of preference indicated that Concept 1 (Red) was the most popular corridor with 1,835 supporters (19.5 percent of respondents), followed by Concept 4 (Gold) with 1,551 supporters (16.5 percent), and Concept 9 (Dark Green) with 999 supporters (10.6 percent). The 768 comments received expressing a preference on corridor concepts included comments in support of and opposed to each of the nine concepts presented at the meeting. However, a majority of these comments were categorized as "Favor Concept 1 (Red)" or "Favor Concept 4 (Gold)"; more commenters expressed their support for these two concepts than all other concepts combined. Approximately 576 comments were received regarding the potential impacts various corridor concepts may have to homes, businesses, farmland, cemeteries, and the environment throughout the project study area. A number of these comments related to specific neighborhood concerns (specifically, impacts to the Spring Mill Plantation, Crow Creek, Meadowlands, and Ocean Ridge neighborhoods) and general quality of life concerns in the towns of Calabash and Carolina Shores in North Carolina. Approximately 420 comments were received that voiced a need for or suggestions to alternative concepts from the nine presented at the public meetings. While most of these comments simply referred to a general need to reconsider the project study area, many commenters recommended their own alternative designs. The alternative designs were considered within the context of the various concepts already considered and the project study area. Adjustments to the Detailed Study Alternatives were made within this context, when appropriate. Additional comments were received related the following issues: concerns about increased traffic and safety (i.e., crash) issues in the study area (74); concerns about increased risk of flooding due to water runoff from the proposed project and the need for additional hurricane evacuation routes (66); the preservation of Indigo Farms (62); and requests for more information on the project schedule, cost, and funding (53). A total of 51 comments were received that either voiced non-specific opposition to the project or asserted the project is not needed in North Carolina. The primary argument for the latter was that traffic will be bypassing towns in Brunswick County as tourists travel to and from Myrtle Beach, forcing North Carolina citizens to front the expense of the proposed project without benefit to the local economy.

5.2.2.2 Local Government Comments

The comments received from the December 3 and 4, 2019 public meetings included four comments from local governments in the project study area, as follows:

- A resolution submitted by the Town of Sunset Beach voiced their opposition to all nine corridor concepts on the grounds that each would connect with US 17 at NC 904 and run along it for 6.3 miles until it joins the Shallotte Bypass. The Town submitted an alternative corridor concept that would extend Concept 1 inland and parallel to US 17 from Pea Landing Road NW to US 17 north of Shallotte.
- A resolution submitted by the Town of Carolina Shores expressed concern and opposition to any of the corridor concepts that would impact an existing, established neighborhood. Therefore, the Town submitted their support for Corridor Concepts 1 (Red) or 4 (Gold).

- The Town of Shallotte submitted a letter voicing their support of the project, specifically Corridor Concepts 1 (Red) and 2 (Light Green). They also noted a concern about the project's design at the south end of Main Street, where the Town feels an interchange is necessary for emergency service accessibility.
- A resolution submitted by the Town of Calabash expressed concern that the Parkway will impact a number of businesses and neighborhoods in the project study area regardless of which concept is selected. While the Town formally endorsed Corridor Concept 6 (Dark Blue), they also recommend the project team explore a tenth alternative similar to the proposal submitted by the Town of Sunset Beach to further minimize impacts to the area's residents.

5.2.3 Other Public Outreach

The first Carolina Bays Parkway Extension project newsletter was mailed to citizens and other stakeholders within the study area in December 2018. The purpose of the first newsletter was to introduce the local community to the project and provide general information about the planning process, as well as to request community input on the project's draft purpose and need and area transportation needs. The December 2018 newsletter can be found on the project website (www.ncdot.gov/projects/carolina-bays-parkway), under the heading "Project Documents." A second newsletter will be mailed following the release of this document to announce its availability for public review and comment, as well as the dates for the public hearing.

A toll-free project information line and project email address were established in 2018 to receive project comments and questions. A project website (www.ncdot.gov/projects/carolina-bays-parkway) was also developed in 2018 to make project mapping, newsletters, and other project information available to the public. In addition, the website provides contact information for the NCDOT and SCDOT project representatives. The website link and project representative contact information was also provided in project newsletters and handouts.

In 2018, a Carolina Bays Parkway Extension public input web page was also added to the NCDOT Engagement Hub (https://publicinput.com/carolina-bays-pkwy). In addition to providing project mapping and other information similar to the project website, the project's public input web page allows the public to participate in project surveys and to provide comments. Users of the public input web page are also provided with the option to translate the entire Carolina Bays Parkway Extension web page into over 100 different languages by clicking on the "Translate" icon located in the banner at the top of the web page. In addition, within the section of the web page titled "Resources for Property Owners," the video titled "NCDOT Right of Way Acquisition Process," as well as the brochure titled "Understanding the Right of Way Process," are provided in both English and Spanish. These materials are for reference by individuals whose residence or business may be displaced by the proposed project.

Most of the public involvement materials developed to date (i.e., newsletter, public meeting handout and maps, etc.) can be found on the project website and/or the public input web page.

Stakeholder interviews and a series of small group meetings and pop-up events were conducted in November 2022 to provide project information and gather feedback from residents in eight communities throughout the Carolina Bays Parkway Extension project area. Stakeholders and community organizations within the eight communities were contacted via phone and/or email to obtain their assistance with inviting their residents to attend an in-person meeting or a pop-up event. Postcards were mailed to all tenants and property owners in advance to inform them of the upcoming

meetings. Each one-hour meeting began with a formal presentation to provide an overview of the proposed project and proposed design alternatives, followed by a group discussion. Staff closed the meeting by providing contact information for the project and a link to the project website should attendees have any further thoughts they would like to share after the meeting. Attendees could also share their thoughts using a paper comment form that was provided in the meeting handout. Handouts at these meetings were provided in English and Spanish. A detailed discussion of the stakeholder interviews, small group meetings, and pop-up events conducted in November 2022 is provided in the *STIP Project No. R-5876 Carolina Bays Extension Environmental Justice Outreach Summary* (PPP, January 2023). This report was prepared and finalized under a prior regulatory regime and does not reflect recent changes in regulatory or Executive Order requirements.

A total of 38 comments and one signed petition were received over the comment period. Residents shared comments about the loss of housing, churches, and long-standing community. Several community members identified themselves as seniors living on a fixed income. These individuals indicated that they have limited options or desires for relocation. Some shared fears about pollution and traffic. Others expressed concerns that they did not wish to sell their land.

A petition signed by 31 community members of McMilly Road, Old Shallotte Road, and NC 130 located in Brunswick County was submitted to oppose the Carolina Bays Parkway Extension project.

Comments received also discussed the following topics:

- Project Impacts:
  - Effects to personal property (direct impacts, reduction of property values, difficulty selling due to uncertainty about the project, ability to obtain replacement housing).
  - Effects to local businesses and employment opportunities.
  - Effects to Shallotte Manor Apartments.
  - Effects to local fire stations (noted this is the only one in the community).
  - Concerns about direct impacts and accessibility for local schools.
  - Concerns about the number of cemeteries impacted and potential for grave relocations.
  - Agricultural community impacts and stream/wetland impacts (specific to Alternative 4).
  - Concerns about disproportionate impacts to minority and low-income communities within the project area.
- Access Changes:
  - Questions about the level of access control for the proposed Carolina Bays Parkway Extension.
  - Questions about selection of the northern terminus for the project and suggestions for extending the terminus farther north.
  - Questions about access to the Carolina Bays Parkway Extension from local roads such as Shamrock Drive.
  - Questions about the proposed vertical alignment of the road and grade separations.
  - Concern about effects to local roads including McMilly Road and Little River Road.

- Project Communications:
  - Requests to speak with the engineers/project managers about the proposed action.
  - Questions about the decision-making process for the Applicant's Preferred/LEDPA corridor and types of effects analysis used.
  - Questions about the timeline for selection of the Applicant's Preferred/LEDPA corridor and right-of-way acquisition process.
  - Requests to hold additional public involvement opportunities, revise website with larger font, and resend postcard notifications as a formal letter.
- Purpose and Need:
  - Questions about why the project is needed and who would benefit.
  - Questions about whether the project is intended for economic development.
- Follow-Up Items:
  - Residents requested information on project-specific technical studies that assess socioeconomic and community impacts.
  - Residents requested a list of businesses that would be impacted by each Detailed Study Alternative.
  - Residents requested additional meetings with project engineers and managers.

5.2.4 Citizens' Group Comments

Following the CP 2 meeting, NCDOT and SCDOT reviewed an additional concept alternative, Alternative Inland Concept, for the Carolina Bays Parkway Extension Project presented by a citizens' group to NCDOT on December 10, 2020. A figure showing the Alternative Inland Concept is included in the Supplementary NOI (see Figure 4) in Appendix B. It begins in South Carolina at the terminus of the current Carolina Bays Parkway at SC 9. The concept then flows in a northeasterly direction through a portion of the Carolina Bays Parkway Extension study area, roughly parallel and inland of existing US 17. The concept terminates near the existing I-140/US 17 interchange area just west of Leland, North Carolina, which is approximately 25 miles northeast of the project's proposed northeastern terminus at the US 17 Shallotte Bypass and well outside of the expanded project study area boundary established by the Merger Team at the May 4, 2020 CP 2 meeting. In order to determine if this alternative is practicable and feasible, a 1,000-foot-wide corridor was established for the Alternative Inland Concept.

Within the vicinity of the current Carolina Bays Parkway Extension study area, the Alternative Inland Concept alignment is similar to previously evaluated alignments, including one of the Detailed Study Alternatives for the project – Alternative 4A. However, the Alternative Inland Concept would provide increased potential to impact community features and environmental resources. The concept would increase impacts to the floodplain associated with the Cawcaw Swamp and would directly impact the residences located off of Russtown Road along Bayfield Lane and Grove Circle Court. The concept would also require controlling access along a portion of NC 130, which would impact access to West Brunswick High School and businesses along that facility. Additionally, extending the project 25 miles to the northeast to terminate at the I-140/US 17 interchange takes the alternative well outside of the expanded project study area boundary established by the Merger Team at the May 4, 2020 CP 2 meeting. It is also well beyond the scope and financial feasibility of the Carolina Bays Parkway Extension

Project as programmed in the current NCDOT STIP. Because of those potential additional impacts to natural resources described above and the access impacts to West Brunswick High School and businesses along NC 130, NCDOT and SCDOT determined that the Alternative Inland Concept was not practicable or feasible and eliminated it from further consideration. On March 2, 2021, NCDOT provided a response to the citizens' group outlining the aforementioned reasons why the Alternative Inland Concept was eliminated from further study.

In a follow-up submittal on May 12, 2021, the citizens' group presented NCDOT with a revised concept that would alter the northern terminus of the Alternative Inland Concept to tie into a future interchange at US 17 Shallotte Bypass and Smith Avenue (currently proposed under NCDOT Project U-5862, which is funded in the NCDOT 2024-2033 STIP for right-of-way in 2028 and construction in 2030). In order to determine if this revised concept, the Conceptual Citizen Option, is practicable and feasible NCDOT and SCDOT prepared a conceptual design as a representation of the revised concept and conducted a detailed review of its anticipated benefits and impacts based on a 1,000-foot-wide corridor. A figure showing the Conceptual Citizen Option is included in the Supplementary NOI (see Figure 5) in Appendix B.

The Conceptual Citizen Option is only located in the North Carolina section of the proposed project and is a variation of Detailed Study Alternatives 1A and 4A. The option would address the transportation needs in the study area. It would extend the traffic benefits of the Carolina Bays Parkway Extension further to the north, and also would terminate at an advantageous location at the proposed US 17 Shallotte Bypass/Smith Avenue interchange. However, the option would not fully utilize a controlled access portion of the US 17 Shallotte Bypass to the west of the proposed interchange and is located outside of the study area established by the merger team. The impacts to High Quality Water (HQW) with the option would be more than double the impacts of the highest Detailed Study Alternatives based on 400-foot-wide corridors. In addition, depending on whether the Conceptual Citizen Option is paired with Concept 1A or 4A, the wetlands impacts would be as high or substantially higher than the alternative with the highest wetlands impacts based on the 400-foot impact boundary. The potential increased natural resources impacts and high costs made this alternative not practicable or feasible when compared to the other Detailed Study Alternatives. As such, NCDOT and SCDOT determined that the Conceptual Citizen Option did not require further consideration. On August 12, 2021, NCDOT mailed a response letter to the citizens' group outlining the aforementioned reasons why the Conceptual Citizen Option was determined not to be practicable or feasible and, therefore, was eliminated from further study.

The 2 options presented by the Citizen's Group will be reviewed by the merger team at the next Merger Team Meeting (CP3).

5.2.5 Public Hearing

A public hearing for this project will be held following approval of this document and prior to right-of-way acquisition. The alternatives still under consideration for the project will be presented to the public for their comments at the hearing. The Applicant's Preferred/LEDPA corridor for the project will be selected following the hearing. Citizen comments will be taken into consideration in the selection of the Applicant's Preferred/LEDPA corridor. A second hearing will potentially be held following the selection of the Applicant's Preferred/LEDPA corridor to present the proposed design within the selected corridor.

5.3 Public Interest Review

The proposed project will be reviewed in accordance with 33 CFR 320-332, the Regulatory Programs of the US Army Corps of Engineers, and other pertinent laws, regulations, and executive orders. The decision whether to authorize this proposal will be based on an evaluation of the reasonably foreseeable effects of the proposed action consistent with Section 102 of NEPA on the public interest. That decision will reflect the national concern for both protection and utilization of important resources. The benefits, which reasonably may be expected to accrue from the proposal, must be balanced against its reasonably foreseeable detriments. All factors, which may be relevant to the proposal, will be considered. Among those are conservation, economics, aesthetics, general environmental concerns, wetlands, historic properties, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shore erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production, mineral needs and, in general, the needs and welfare of the people.

All public interest factors have been reviewed. The following public interest factors included in Sections 5.3.1 through 5.3.21 below are considered relevant to this proposal.

5.3.1 Conservation

Significant Natural Heritage Areas and managed preservation areas are discussed in Section 3.3.8.3. Section 3.2.1.4 discusses conservation areas in relation to land use plans for the local planning jurisdictions within the study area. Section 4.2.1 provides information on compatibility with these local land use plans. Reasonably foreseeable land use effects related to development are discussed in Section 4.2.3, and reasonably foreseeable resource effects due to the project and actions by others are discussed in Section 4.2.4.

5.3.2 Economics

In accordance with 33 CFR 320.4(q), Section 4.1.4 describes the economic effect of the proposed project. The potential economic effects as a result of reasonably foreseeable land use changes associated with the proposed project are discussed in Section 4.2.3. The potential economic effects as a result of reasonably foreseeable resource effects due to the project and actions by others are discussed in Section 4.2.4.

5.3.3 Aesthetics

All of the Detailed Study Alternatives are on new location in South Carolina and would have generally the same visual and aesthetic impacts. All of the Detailed Study Alternatives in South Carolina would result in some replacement of vegetation with asphalt and vertical and horizontal changes in the view of the rural landscape, which would impact travelers using existing roadways and nearby homes and businesses. Detailed Study Alternatives 1, 1A, and 2 would impact the views from residential areas in the vicinity of the Wampee Road corridor for much of its length between SC 9 and the North Carolina State Line with the introduction of an interchange, which would create horizontal and vertical changes in the landscape. CP1 – S1 would result in low visual impacts in South Carolina, as the new location portion of the project would end at S-111 and existing roadways would be improved for the remainder of the project length.

In North Carolina, the portions of the Detailed Study Alternatives on new location would have similar visual and aesthetic impacts on rural and suburban areas in southwestern Brunswick County as the new location alternatives in South Carolina. Alternatives 1A and 4A would have the greatest visual impacts to rural landscapes since these alternatives are almost entirely on new location in North Carolina. Alternatives 1A and 4A would also have visual impacts on residential areas to the northwest of Shallotte in the vicinity of Wildwood Street. Alternatives 1 and 4 would have intermediate visual impacts on rural landscapes in comparison to the other Detailed Study Alternatives in North Carolina. Alternatives 2, 7, and 8 would have the lowest visual impacts on rural landscapes in North Carolina since these alternatives follow longer sections of existing US 17, with Alternative 8 expected to be the lowest. However, Alternatives 2, 7, and 8 would have substantial visual impacts on rapidly developing residential areas in the Carolina Shores area between Hickman Road and existing US 17 on the north side of the South Carolina State Line. Alternative 7 would introduce an interchange into these residential areas at Calabash Road. CP1 – S2 would result in low visual and aesthetic impacts in North Carolina, as the new location portion of the project would end at Ash Little River Road, McLamb Road, or US 17,and existing roadways would be improved for the remainder of the Construction Phase 1 length.

Section 4.7.3 addresses temporary visual impacts associated with project construction.

5.3.4 General Environmental Concerns

General environmental concerns, including beneficial and detrimental effects have been evaluated in accordance with 33 CFR 320.4(p). Information pertaining to other environmental factors is addressed in Sections 5.3.5 through 5.3.21 below.

5.3.5 Wetlands

Wetland impacts have been evaluated in accordance with 33 CFR 320.4(b). Although estimated wetland impacts for the project range from 137.0 acres to 213.1 acres, depending on the Detailed Study Alternative, no anadromous fish spawning areas, shellfish growing areas, or primary nursery areas will be affected. Additionally, there would be no impacts to Essential Fish Habitat or Coastal Area Management Act Areas of Environmental Concern. Sections 3.2.1.4 and 4.2.1 address wetland conservation areas. Sections 3.6.4, 4.2.4, and 4.6.4 provide additional specific information regarding wetlands in the project study area.

Per the 2008 USACE and US Environmental Protection Agency (USEPA) Mitigation Rule (i.e., 33 CFR Part 332), compensatory mitigation is the restoration (re-establishment or rehabilitation), establishment (creation), enhancement, and/or in certain circumstances preservation of aquatic resources for the purposes of offsetting unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved.

The NCDOT will investigate potential on-site stream and wetland mitigation opportunities once the Applicant's Preferred/LEDPA corridor has been selected. On-site mitigation directly adjacent to the project will be used as much as possible in order to provide the maximum possible amount of compensatory mitigation for stream and wetland impacts. Offsite mitigation needed to satisfy the Federal Clean Water Act requirements for this project will be provided by the North Carolina Division of Mitigation Services, NCDOT Stream and Wetland In-Lieu Fee Program.

SCDOT uses compensatory mitigation to restore, establish, enhance, or preserve other aquatic resources for unavoidable impacts to Waters of the US by a transportation project. Per the 2008 USACE and USEPA Mitigation Rule and USACE Charleston District Compensatory Mitigation Guidelines, the hierarchy for consideration of mitigation is based upon the likelihood of mitigation plans being successful and sustainable, which prioritizes mitigation bank credits or in-lieu fee program credits over Permittee-Responsible Mitigation (PRM) options. If a proposed project is located within the primary service area of an existing mitigation bank or in-lieu fee program, the permit applicant will normally be required to purchase the necessary mitigation credits. South Carolina does not have an approved in-lieu fee program established for compensatory mitigation. Once the Applicant's Preferred/LEDPA corridor is selected, SCDOT investigates the availability of stream and wetland mitigation credits at commercial mitigation banks which service the project area. The USACE's Regulatory In-lieu Fee and Bank Information Tracking System (RIBITS) site is used to identify mitigation banks with available credits. Mitigation banks servicing the project area with available credits are then contacted to confirm availability and cost for credits needed.

Compensatory mitigation of impacts to wetlands is discussed in Section 4.6.4.1.2.

5.3.6 Historic and Cultural Resources

In accordance with 33 CFR 320.4(e), impacts to historic and cultural resources have been evaluated as a part of the project. Sections 3.4 and 4.4 provide information on the resources and impacts.

5.3.7 Fish and Wildlife Values

In accordance with 33 CFR 320.4(c), NCDOT and SCDOT have coordinated extensively with the US Fish and Wildlife Service, the NC Wildlife Resources Commission, and the SC Department of Natural Resources, as detailed in Section 5.1 and Appendix B. Fish and wildlife resources are detailed in Sections 3.6 and 4.6.

5.3.8 Flood Hazards

Sections 3.3.7 and 4.3.8 address flood hazard issues. In addition, NCDOT and SCDOT have coordinated with local planners to ensure the proposed project is compatible with local plans, including hazard mitigation.

5.3.9 Floodplain Values

As stated in 33 CFR 320.4(l)(1)(i), floodplains are valuable in providing a natural moderation of floods, water quality maintenance, and groundwater recharge. All of the Detailed Study Alternatives cross the 100-year floodplain in North Carolina, but there are no 100-year floodplain crossings in South Carolina with any of the Detailed Study Alternatives. Table 4-14 shows the anticipated impacts of the Detailed Study Alternatives on 100-year floodplain and floodway. During the development of the alignment and design of the Detailed Study Alternatives, efforts were made to avoid and minimize impacts to 100-year floodplain wherever practicable, including generally locating crossings of the 100-year floodplain surrounding Cawcaw Swamp and Shingletree Swamp at the narrowest portion of the floodplain in the vicinity of the new location alignments and bridging these crossings. An attempt was made to cross streams and floodplains as close as possible to 90-degrees to minimize impacts to both jurisdictional resources and Federal Emergency Management Agency (FEMA) regulated floodplains and floodways.

These crossings are considered lateral or perpendicular in nature and not longitudinal or transverse to the floodplain. As shown in Table 2-2, bridges are proposed at all major hydraulic sites where the Detailed Study Alternatives have a new location crossing of the 100-year floodplain surrounding Cawcaw Swamp and Shingletree Swamp. All of the Detailed Study Alternatives also include major hydraulic crossings in a Federal Emergency Management Agency (FEMA) detailed study Special Flood Hazard Zone in North Carolina. Hydraulic design for these crossings shall meet requirements set forth by FEMA's National Flood Insurance Program (NFIP), the NC Floodplain Mapping Program (FMP), and NCDOT for major hydraulic crossings to ensure that there are no adverse impacts to any upstream and downstream insurable structures located within the floodplains or floodways. The *Preliminary Hydraulics Study for Environmental Impact* (NV5, April 2022), which is appended by reference, documents the results of the field investigations and preliminary hydraulic study for the major stream crossings located within the study area, including proposed major hydraulic structures. The proposed major hydraulic structures are discussed in detail in Section 2.7.4.

A floodway and floodplain evaluation was conducted in accordance with 23 CFR 650A (Location and Hydraulic Design of Encroachments on Flood Plains). The floodway and floodplain evaluation is discussed in detail in Section 4.3.8. Both Horry County, South Carolina and Brunswick County, North Carolina are participants in the NFIP.

The NCDOT Hydraulics Unit will coordinate with the NC FMP, the delegated North Carolina state agency for administering FEMA's NFIP, to determine the status of the project with regard to applicability of NCDOT's Memorandum of Agreement with NC FMP (dated April 22, 2013, modified August 12, 2016), or approval of a Conditional Letter of Map Revision (CLOMR) and subsequent final Letter of Map Revision (LOMR). This project involves construction activities on or adjacent to FEMA-regulated streams in North Carolina. Therefore, NCDOT Division 3 shall submit sealed as-built construction plans to the NCDOT Hydraulics Unit upon completion of project construction, certifying that the drainage structure(s) and roadway embankment that are located within the 100-year floodplain were built as shown in the construction plans, both horizontally and vertically.

Additional information regarding floodplains is located in Sections 3.3.7 and 4.3.8.

5.3.10 Land Use

Land use information and impacts are detailed in Sections 3.2 and 4.2.

5.3.11 Navigation

There are no rivers or streams within the study area that have been designated by the USACE as a Navigable Water under Section 10 of the Rivers and Harbors Act. The project will have no effect on navigation, and no permits from the US Coast Guard are required.

5.3.12 Shore Erosion and Accretion

The proposed project will have no effect on shore erosion or accretion, as it pertains to 33 CFR 320.4.

5.3.13 Recreation

No recreation facilities, including sidewalks, greenways, or trails, are included as part of the proposed Carolina Bays Parkway Extension. In addition, the proposed project would not be conducive to pedestrian or bicycle uses, and is not expected to affect pedestrian or bicycle access. Section 3.2.2.3 discusses existing and planned bicycle and pedestrian facilities within the study area, and Section 4.2.2.3 provides information related to potential impacts to these facilities. Section 3.1.3.3 discusses recreational facilities within the study area.

5.3.14 Water Supply

In accordance with 33 CFR 320.4(m), impacts to the study area water supply are detailed in Sections 3.6.3 and 4.6.3.

5.3.15 Water Quality

The proposed project will require Section 401 Water Quality Certifications from NCDWR and SCDHEC. NCDOT and SCDOT have coordinated extensively with NCDWR, SCDHEC, and USEPA regarding compliance with the Clean Water Act, in accordance with 33 CFR 320.4(d). Detailed information related to water quality compliance and coordination can be found in Sections 3.6.4, 4.2.3, 4.2.4, 4.6.3, 4.6.4.1.2, and 5.1 and Appendix B.

5.3.16 Energy Needs

As stated in Section 4.7.1, and in accordance with 33 CFR 320.4(n), the proposed project will not increase the production, transmission, or conservation of energy. However, construction of the proposed project is expected to result in less total energy utilization than the No-Build Alternative, due to congestion reductions and increased safety.

5.3.17 Safety

The proposed project is expected to reduce the potential for crashes associated with traffic congestion along existing roadways, due to a reduction in traffic volumes. The Carolina Bays Parkway Extension is proposed as a median-divided, full control of access facility, reducing the likelihood of head-on collisions and crashes associated with turning movements.

5.3.18 Food and Fiber Production

Section 4.3.4 states that the proposed project will impact prime farmland in both Horry County and Brunswick County, ranging from a combined total of 627.3 acres to 960.5 acres, depending on the Detailed Study Alternative. Farmland within the study area is described in Section 3.3.3, and Section 4.3.4 describes impacts to farmland.

5.3.19 Mineral Needs

The current extent of mining activities within the study area will not be impacted by the project, although two properties containing permitted active sand and gravel mining operations in Brunswick County are crossed by the Detailed Study Alternatives. Alternatives 1 and 4 would take a small portion

of land along Pea Landing Road from the Benton Tract Sand Mine. Alternatives 1A and 4A would take a small portion of land from the southeastern corner of the Simmons Mine. Additional information related to mineral resources is located in Sections 3.3.6 and 4.3.7.

5.3.20 Considerations of Property Ownership

Considerations of property ownership have been made during evaluation of the proposed project. Every effort has been made to balance impacts to both the human and natural environments. There will be no impacts to public rights to navigation. Any unavoidable impacts, including to riparian rights, on individual property owners will be handled during the right-of-way acquisition phase of the project. Additional information related to considerations of property ownership can be found in Sections 3.1.3, 3.1.4, and 4.1.1 to 4.1.3.

5.3.21 Needs and Welfare of the People

The general needs and welfare of the people are addressed in Sections 3.1 and 4.1. Section 1.2 discusses the purpose of the proposed project, and Section 1.3 discusses the needs to be addressed by the proposed project. Section 1.3.2 discusses potential additional benefits of the proposed project with respect to safety improvements.

6.0 List of Preparers

Chapter 6 includes a list of the principal participants in the preparation of this Draft Environmental Impact Statement.

Name	Organization	Qualifications	Primary Responsibilities
Seth Wilcher Preconstruction and Environment Specialist	Federal Highway Administration	MA in Historic Preservation with 18 years' experience ensuring NEPA compliance for Federal infrastructure projects	NOI and DEIS review
Krista Kimmel, PE Project Manager	North Carolina Department of Transportation	BS in Civil Engineering and BA in Mathematics with 16 years' experience in transportation design and project development	Project management, project development, and document review
Mason Herndon Project Development and Environmental Analysis Engineer	North Carolina Department of Transportation	BS in Natural Resources Management and Public Administration with 24 years' experience in environmental planning and NEPA/SEPA studies	Project development, Natural Resources Technical Report review, and document review
Ray Lovinggood, PE Hydraulics Engineer	North Carolina Department of Transportation	BS in Civil Engineering with 32 years' experience in hydraulics engineering on transportation projects.	Preliminary Hydraulics Report review
Lonny Sleeper Former Division Utility Engineer	North Carolina Department of Transportation	BS in Construction Management with 6 years' experience in utility coordination	Utility Technical Memorandum review
Tracy Roberts, AICP Traffic Noise and Air Quality Group Leader	North Carolina Department of Transportation	MPA in Public Administration with 23 years' experience in NEPA, traffic noise and air quality studies	Traffic Noise Report and Air Quality Report review
Kate Husband Architectural Historian	North Carolina Department of Transportation	MS in Historic Preservation with 14 years' experience in historic architectural analysis for NCDOT	N.C. Historic Eligibility Report review and Effects Determination
Mary Pope Furr Historic Architecture Team Lead	North Carolina Department of Transportation	MA in Historic Architecture with 28 years' experience in historic architectural analysis for NCDOT	N.C. Historic Eligibility Report review and Effects Determination
Colin Mellor Former Environmental Policy Unit Eastern Team Lead	North Carolina Department of Transportation	MS in Geology with 25 years' experience in permitting, environmental documentation, planning and project development of transportation projects	Document review and regulatory guidance
Herman Huang, PhD Community Planner	North Carolina Department of Transportation	PhD in City and Regional Planning with 30 years' professional experience and 16 years in community studies	Community impact assessment/indirect and cumulative effects assessment review

Name	Organization	Qualifications	Primary Responsibilities
Harrison Marshall, AICP Community Studies Team Leader	North Carolina Department of Transportation	MA in Urban and Environmental Planning with 25 years' experience in NEPA human environment and Community Impact Assessment	Community impact assessment/indirect and cumulative effects assessment review
Leah Quattlebaum, PE Project Manager	South Carolina Department of Transportation	BS in Civil Engineering with 25 years' experience in transportation project development	Project development and document review
Chris Cooper NEPA Coordinator, Hazardous Materials	South Carolina Department of Transportation	BA in Communications with 25 years' experience as an environmental professional	Project development and document review
Erin Jenkins RGP2 Permits Coordinator	South Carolina Department of Transportation	BS in Biology with 12 years' experience in environmental permitting	Project development and Natural Resources Technical Report review
David Kelly NEPA Division Manager, Architectural Historian, Noise	South Carolina Department of Transportation	BA in History and Art History, MA in American Studies, MA in Historic Preservation with 11 years' experience in transportation project development	Historic Resources Technical Report review and Noise Report review
Chad Long Director of Environmental Services	South Carolina Department of Transportation	MA in Anthropology with 25 years' experience in environmental and transportation development	DEIS development
Eric Midkiff, PE Planning Group Manager	NV5 Engineers & Consultants	BS in Civil Engineering with 34 years' experience in environmental and transportation planning and project development	Overall project management and development of the DEIS
J.A. Bissett, PE Principal	NV5 Engineers & Consultants	BS in Civil Engineering with 38 years' experience in environmental and transportation planning and project development	Quality assurance
Brian Yamamoto, PE Senior Project Development Engineer	NV5 Engineers & Consultants	BS in Civil Engineering with 36 years' experience in environmental and transportation planning and project development	DEIS development and quality assurance
Bobby Norburn Senior Project Manager	NV5 Engineers & Consultants	BS in Civil Engineering with 32 years' experience in environmental and transportation planning and project development	DEIS development and lead document writer
David Bocker, PE Water Resources Group Manager	NV5 Engineers & Consultants	BS in Civil Engineering with 25 years' experience in hydraulics engineering on transportation related projects	Hydraulic investigations and Preliminary Hydraulics Report development
Martha Hodge, AICP Former Project Manager	NV5 Engineers & Consultants	MS in Regional Planning and BA in Economics with 17 years' experience in community and transportation planning and project development	Community impacts analysis, indirect and cumulative effects analysis

Name	Organization	Qualifications	Primary Responsibilities
Nick Mountcastle Planning Project Manager	NV5 Engineers & Consultants	BS in Natural Resources with 9 years' experience in environmental and transportation planning and project development	Environmental document preparation and community impact analysis
Eric Smith GIS Group Manager	NV5 Engineers & Consultants	MA in Geography and BA in Environmental Science with 23 years' experience in GIS	Alternatives screening/ impacts analysis, GIS data collection, and figure development
Michael Houser, GISP GIS Specialist	NV5 Engineers & Consultants	BA in History with Minor in Geography and Program Certificate in GIS with 8 years' experience in geographic information systems and graphics	GIS data collection and figure development
Heather Wallace Former Environmental Services Group Manager	NV5 Engineers & Consultants	BS in Ecology with 22 years' experience in natural resource evaluations, technical report preparation, and project management	Natural resource investigations and Natural Resources Technical Report development
Adam Efird Former Environmental Project Manager	NV5 Engineers & Consultants	MS in Natural Resources with 16 years' experience in environmental consulting, wetland ecology, and natural resources	Natural resource investigations and Natural Resources Technical Report development
Steve Drum, PE Senior Transportation Technical Lead	NV5 Engineers & Consultants	BS in Civil Engineering with 37 years' experience in transportation infrastructure projects	Roadway design technical lead and quality assurance
Johnny Banks Transportation Senior Project Manager	NV5 Engineers & Consultants	Associates in Applied Science in Architectural Technology with 36 years' experience in roadway design	Functional design preparation and quality assurance
Abby Vogt Transportation Project Manager	NV5 Engineers & Consultants	BS in Civil Engineering with 20 years' experience in roadway design	Functional design preparation
Erica Martin Transportation Designer	NV5 Engineers & Consultants	BS in Biology with 17 years' experience in roadway design	Functional design preparation
Anne Lenart-Redmond Transportation Planning Director	STV	BS in Civil Engineering with 30 years' experience in project development and NEPA documentation with specialty in Indirect and Cumulative Effects	Community impact analysis lead and Community Impact Assessment Report
Brad Thompson, AICP Vice President, Tennessee Operations Manager	STV	MS in Urban and Regional Planning and BA in Geography with 23 years' experience in NEPA documentation, public outreach, and project development	Community Impact Assessment Report and Indirect and Cumulative Effects Analysis

Name	Organization	Qualifications	Primary Responsibilities
Deborah Connor Senior Planner	STV	MS in Regenerative Studies and BA in Urban and Regional Studies with 17 years' experience in NEPA process and documentation	Community Impact Assessment Report
Katie Curry, AICP Planning Manager	STV	MS in City and Regional Planning with 13 years' experience in NEPA and transportation project development	Community Impact Assessment Report
Oriana Roumillat, PE Utility Coordinator	STV	BS in Civil Engineering and Physics with 28 years of experience in utility coordination and roadway construction	Utilities Report development
Justin Hill Utility Coordinator	STV	AS in Civil Engineering with 21 years' experience in utilities construction, planning and project development	Utilities Report development
Jennifer Pearson Senior Environmental Project Manager	HDR	BS in Biology with 23 years' experience in NEPA process development and documentation	Project development – South Carolina coordinator
Shannon Meder Former STV NEPA Coordinator	HDR	BS in Environmental Resources Management with 23 years' experience in environmental and transportation planning and project development	Project development – South Carolina coordinator
Sara Easterly Lead Environmental Scientist	HDR	MS in Environmental Health Science and BA in Biology with 20 years' experience in environmental science	Lead scientist for jurisdictional resources and endangered and threatened species surveys
Brad Taylor, PE Senior Roadway Engineer	HDR	BS in Civil Engineering with 22 years' experience in roadway design	Functional design quantity calculations and cost estimates
Travis Braswell, PE Project Manager	Mott MacDonald	BS in Civil Engineering with 19 years' experience in traffic engineering including freeway and interchange capacity analysis, corridor studies, traffic impact assessments, and traffic safety evaluations	Lead traffic analyst and Capacity Analysis Report development
Craig Gresham	Clearbox Forecast Group	BS and MS in Civil Engineering with 26 years' experience in travel demand analysis and project-level traffic forecasting	Project-Level Traffic Forecast development